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COMPRESSORS • AIR HOISTS • I-BEAM CRANES AND TROLLEYS

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Reg. U. S. Pat. Off.
Published Weekly

Volume 77 Number 23

JULIAN CHASE, Directing Editor
HERBERT HOSKING, Editor
P. M. HELDT, Engineering Editor JAMES U. STEINFIRST, News Editor
JOS. GESCHELIN, Detroit Technical Editor GEOFFREY GRIER, Art Editor
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Advertisers' Index 62

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C. A. MUSSELMAN, Pres.; J. S. HILDRETH, Vice-Pres. and Manager, Automotive Division; G. C. BUZBY, Vice-Pres.

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AUTOMOTIVE INDUSTRIES

December 4, 1937
Vol. 77, No. 23

Operations Sensitized to Demand

Production Schedules Subject to Sudden Revision As Most Plants Catch Up on Orders

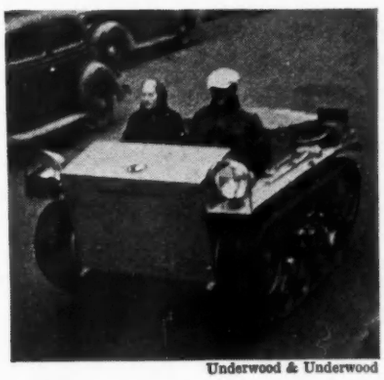
According to present indications, the automobile industry this month will be operating at about two-thirds the rate that obtained in December last year when an unprecedented backlog of fall orders was pushing production up around capacity level. Operating schedules now are elastic and subject to sudden revisions to conform with variations in current retail demand since in a majority of cases the plants have caught up on orders. Output projections for December are, therefore, at best only good guesses. As it looks now, the industry should turn out somewhere around 350,000 cars and trucks this month, which would compare with 518,958 units in December last year, a drop of 32 per cent.

With all the curtailment in effect at many plants last month, the industry is estimated to have come within 9 per cent of its November output a year ago. Preliminary figures of leading plants indicate November production in the neighborhood of 370,000 units which compares with 337,979 units in October and 405,799 in October, 1936. The figure for October this year is the official count of the Department of Commerce, recently released. It brought the final total for the first 10 months this year to 4,292,992 units as against 3,691,517 in the corresponding period last year, a gain of 16.3 per cent.

The October production was up 92 per cent over September and approximately 47 per cent over October, 1936, reflecting the earlier start on new models and speedier resumption of full scale production. This prompt stocking of dealers with 1938 cars is one of the reasons why curtailment is now in order at the plants. In actual units, there were 107,930 more cars and trucks placed in the field during October than were shipped out in the corresponding month last year. For that reason, the final quarter this year will show a relatively small drop from the like 1936 period despite the drastic retrenchment this month. If the final figures for November and December approximate the above projections, then the current quarter's total will be somewhere in the neighborhood of 1,060,000 units or roughly 8 per cent under the total of 1,154,806 for the fourth quarter of last year.

It was not until the middle of

(Turn to page 794, please)



Underwood & Underwood

TOWN TRACTORS

Farmer and wife "going to town" in the family tractor will probably be a familiar sight to citizens of cities in agricultural districts, as rubber treads on the track-type vehicles permit them to be used on paved highways. The photograph shows a farmer and his wife rolling along a street in Indianapolis, Ind.

"Which Way?"

Alfred P. Sloan, Jr. Gives Views On Current Business Situation

"I am quite convinced that in no sense of the word is there a new depression, as such, getting under way," Alfred P. Sloan, Jr., told members of the Association of Life Insurance Presidents assembled for their thirty-first annual convention in New York City, Dec. 3.

Cautioning that a real depression may result if "we continue to pursue the course that we have been following," Mr. Sloan chairman of the board, General Motors Corp., labeled the current business situation as a "serious interruption in our recovery from the old depression."

"If that be true," he continued, "there is not much use of attempting to forecast whether the change will be long and serious or short and moderate, for it may be either."

After pointing out that industrial production has not reached the rec-

(Turn to page 794, please)

UAW Makes Little Progress at Ford

Strike in St. Louis Assembly Plant So Far Ineffective; Union Abandons Mass Picketing Tactics

Little progress is being made by the United Automobile Workers in their drive to organize Ford employes. The strike at the Ford assembly branch in St. Louis, which started Nov. 24, so far has been ineffective. Production has continued in the face of mass picketing.

M. N. Johnson, plant superintendent, reported 592 men at work Monday out of a normal force of 600. He denied union charges that the plant was operating largely with imported labor instead of regular employes. Unsuccessful in their efforts to close the plant, the strikers, after three days of mass picketing, abandoned these tactics and posted only small groups of pickets at the plant gates. Union officials explained the change was made to avoid irritating police.

Ford attorneys had attempted to obtain a restraining order to prohibit mass picketing but failed to convince Circuit Judge Robert J. Kirkwood that there was "any reason for alarm." The order was denied

(Turn to page 794, please)

TO SEE, NOT SELL

Modern machinery and tools in Buick's factories at Flint, Mich., were inspected recently by more than 30 executives and sales engineers of the Heald Machine Co., Worcester, Mass., on location for the latter company's annual sales convention. This group is watching a noise testing operation in the matching room of the new Buick automatic transmission plant, described in AUTOMOTIVE INDUSTRIES, issue of Sept. 11, 1937, pp. 346-357.

Congress Bucks at Slicing Road Fund

President's Move to Curtail Construction Expenditures Meeting Stiff Opposition by Federal-Aid Adherents

President Roosevelt's move in the direction of economy by suggesting curtailment of expenditures for highway construction is meeting stiff opposition in Congress.

While no protests are being raised against any program to help balance the budget, adherents of the Federal-aid-to-highway program, which was launched in 1916, are objecting to any economy moves using the Federal-highway-aid plan as the starting point.

"If President Roosevelt wants to balance the budget and will reduce everything in proportion to roads, that's one thing," declared Wilburn Cartwright, Chairman of the House Roads Committee. "But to take it out of roads alone is something else." He added that it was not his intention to take the suggestion "lying down."

And others pointed out that the plan advanced by the President would cause unemployment and discourage general contracting and manufacturing of heavy materials and equipment at a time when these same industries should be stimulated.

Still others took the position that to pare the $216,500,000 authorized for highway work for the fiscal year 1939 to $100,000,000, as proposed by Mr. Roosevelt, would constitute a violation of what amounts to a contract with the states for matching funds raised by them for highway construction.

In suggesting that public road authorizations be limited hereafter to around $125,000,000 annually, the President urged that the country revert to the policy of the pre-1929 period when only 80 to 90 million dollars was spent annually by the Federal government for highway aid. In 1936, Congress authorized appropriations of $216,500,000 for each of the fiscal years 1938 and 1939. Out of $3,100,000,000 appropriated for public highways since 1916, $1,490,000,000 has been made available during the last five years, Mr. Roosevelt reported to Congress in his special message.

Adding fuel to the controversy, the Bureau of Public Roads told Congress in its annual report that present funds are insufficient to meet demands for highway construction and improvement because of heavier and speedier automobile traffic. It said that roads completed under its supervision in the 1937 fiscal year totaled 21,700 mi., a record for road building.

"The State highway departments, confronted with increased responsibilities out of proportion to the revenues available to them and pressed with sound arguments to provide improvements in all directions, face difficult problems," the Bureau said.

Plant Notes

International Harvester Addition To Up Daily Output 35 Units

The $1,000,000 addition to the International Harvester Co.'s tractor plant in Chicago will be completed May 1, 1938. New buildings and equipment are to be given over entirely to the production of this company's line of crawler-type tractors. Five different models, including two powered with Diesel engines are to be manufactured.

The building itself is a one-story structure of saw-tooth design with brick and steel walls and gypsum roof. It will add 240,000 sq. ft. of floor space to the present facilities, making the total floor space of this plant approximately 1,400,000 sq. ft.

Five hundred feet will be added to the existing assembly line for International's TracTracTors and the present output of 40 units daily increased to 75.

Marco Mfg. Co., Chicago, manufacturer of ignition repair parts, is moving its plant and office to Fond du Lac, Wis., where the local Association of Commerce has been able to provide a suitable building to accommodate its growth. A new Wisconsin corporation with the same title has been formed, signers of the articles being K. M. McLeod, L. C. Gerhard and K. A. Schmitt.

A. O. Smith Corp., Milwaukee, has announced the purchase of the Smith Meter Co., Los Angles, Calif., manufacturing meters for measuring petroleum products for tank car loading racks, tank trucks, and in refineries. The acquisition is to further round out the A. O. Smith line of products for the oil industry. The meter business was established by Stanley Smith several years ago and is doing a business of $100,000 annaually. Mr. Smith formerly was a member of the A. O. Smith engineering staff in Milwaukee.

Electro-Forg-O-Mat, Inc., Milwaukee, has been organized to engage in the manufacture of forgings by what is called a revolutionary new process in a large addition recently completed by Ampco Metals, Inc., Milwaukee, of which the new firm is a subsidiary. The process was invented and perfected by J. H. Maykemper and Herman Fazel, of Frankfurt, Germany, who have come to America with their invention and joined the Ampco organization after procuring patents in all parts of the world. Parts for the first machine are being made in various Milwau-

kee industries. It will cost about $30,000 and weigh about 35 tons. In the new process, a metal rod of steel, alloy iron or bronze is fed into the machine. The unit electrically heats the metal, cuts it to size and forms the article to be made. No trimming of flash is needed because instead of displacing metal as done in hammering, the new process is said to gather it in, resulting in a finer, closer grained and stronger metallic structure. The machine, it is said, is capable of turning out 25,000 to 50,000 forgings in 25 hr., ten times greater than is possible with the conventional method.

Fuel Price Survey

Canadian Press Checks Situation In Principal Cities of Canada

The Canadian Press recently made a survey of gasoline prices in Canada which showed Montreal to be in the most favorable position with prices, at the time of the check-up, of 18 4/5 cents per gallon for standard gasolines and 26 cents for ethyl. Saskatoon, Sask., is reported at the other extreme with prices of 32.3 and 37.3 respectively.

Prices at Charlottetown, the capital of Prince Edward Island, are 30 and 35 cents. Vancouver pays 27 and 29 cents; Edmonton, 29 and 35; Calgary, 26½ and 32; Winnipeg, 27 and 33; Toronto, 20 4/5 and 25; Quebec, 25 and 29; Three Rivers, 21 and 29; Halifax, 28 and 29; Saint John, 29 and 30.

These prices include the provincial taxes in the various provinces. In Montreal, gasoline is frequently on sale for as low as 11 cents and a fraction; tax on this gallon of fuel is six cents. The six cent tax is the lowest in force, this rate prevailing in Quebec, Ontario, and Alberta. Tax is seven cents per gallon in British Columbia and Saskatchewan, rising to 7½ cents in Manitoba, eight in Nova Scotia and New Brunswick, and reaching the peak on Prince Edward Island of 10 cents per gallon.

Report Olds November Sales

Oldsmobile retail sales for the second 10 days of November totaled 3969 units according to D. E. Ralston, general sales manager. This represents a 102 per cent gain over the same period last year.

Total retail sales of Oldsmobiles from Jan. 1 to Nov. 20 totaled 175,043 as compared with 154,349 for the corresponding period in 1936.

From Japan's Industrial Front

Military Keeping Wary Eye Fixed on Automotive Situation as "Home Industries" Continue Rapid Expansion

Under a bill introduced to the seventy-second extraordinary session of the Imperial Diet, Japan's automotive industries may be placed under war-time control. The law governs production, distribution, and importation of various articles designated as important from the standpoint of national defense.

The preceding session of the Diet already passed the "Revised Military Secrets Protection Law" which enjoins operators in "munitions" plants to observe strict secrecy with respect to productive capacity, material purchases, and other details.

The Nissan Jidosha and other automobile manufacturers had closed their plants to visitors before the law went into effect.

Imports

Automobile importers in Japan are continuing their efforts to persuade the Commerce, Finance, and War authorities to alleviate restrictions on the importation of foreign-built motor-cars. Supply of passenger and commercial vehicles is reported to be far below present demands, although Japanese manufacturers are said to be operating at capacity. The situation is aggravated by increasing military shipments to the China front.

Plant Expansion

It is reported that the Mitsui Gomei Kaisha is planning to increase the capitalization of its subsidiary, the Kosoku Kikan Kogyo Kabushiki Kaisha (High-Speed Engine Industry, Ltd.) so as to enable the firm to undertake the manufacture of passenger cars and trucks.

The Keisan Automobile Trading Co., Tokyo, has established the Keiho Automobile Industry Co. with a capitalization of 1,000,000 yen. An 108,000 sq. ft. plot of ground has been purchased at Tsurumi, near Yokohama. The plant when completed will have a capacity for producing 300 cars a month.

Decision to build a factory at Shin-Urashima, near Yokohama, has been made by the Showa Renault K.K., a joint Franco-Japanese automobile company. According to the plans announced, the plant will be built at a cost of 660,000 yen, and will occupy an area of 170,000 sq. ft. Renault automobiles and airplanes will be produced under Renault license.

Osaka Kikai Seisakusho (Osaka Machinery Works), now engaged in experimental manufacture of passenger cars at its Nagoya plant, is expected to proceed with its proposed commercial automobile enterprise earlier than originally planned. The new building will be situated at Nagoya and occupy an area of 765,000 sq. ft.

Airplanes

Plans are being considered in official quarters to impose restrictions on the importation of aircraft, engines and parts. Military authorities are said to hold to the view that domestic industry has attained "international level" and that therefore imports may be restricted to a few units for experimental purposes. Importation of aircraft, engines and parts may be placed under a license system similar to that set up for the automotive industry.

The Showa Aircraft Engineering Co. is going to build several plants for the manufacture of engines and fuselages. The firm is endeavoring to purchase manufacturing licenses of aircooled, inverted V-type engines from some prominent foreign patentees.

Diesels

A four-cylinder Diesel engine rated at 42 hp. has been developed by the Riken Industrial Co. This company expects to establish a subsidiary firm, to be capitalized at 10,000,000 yen, which will begin manufacturing this engine next spring.

Osaka Seisa Zoki (Chain and Machinery) K.K will build a new plant with a capacity for a monthly production of 100 30-hp. Diesels of the Asakawa type. The company also plans to extend its activity into the production of 40 and 50-hp. Diesels. A capital increase to 20,000,000 yen has been decided.

MEN OF THE INDUSTRY

STEPHEN M. JENKS has been appointed assistant general superintendent of the Gary works, Carnegie-Illinois Steel Corp. Other shifts in personnel made by this company include appointment of **EDWARD A. BROWN, JR.** as assistant to the general superintendent, Dequesne works, and LAURENCE S. DAHL, as superintendent of the Irvin works.

(Turn to next page, please)

W. E. WECHTER is by recent appointment manager of oil and gas engine sales, Atlantic division, for the Worthington Pump and Machinery Corp., Harrison, N. J. His new headquarters will be 2 Park Avenue, New York City.

D. T. DOWNES has accepted a position as development engineer with the Pittsburgh Plate Glass Co. at the recently organized central development laboratory. He was formerly chief engineer, Calorizing Co., Wilkinsburg, Pa.

JOSEPH GESCHELIN, Detroit technical editor, Automotive Industries, will be the speaker at the Dec. 13 meeting of The Society for the Advancement of Management, Detroit Chapter. His subject will be a general discussion of the problems of production management in the automotive industry.

Operations Sensitized

(Continued from page 791)

November that retail sales of the industry began slipping under the level of a year ago. October passenger car registrations were up 18 per cent over October, 1936, totaling 197,391 units for all States except Wisconsin. Truck registrations, however, were off 2.19 per cent from a year ago and totaled 39,433 units.—H. E. G.

UAW at Ford

(Continued from page 791)

but the injunction suit was continued until Dec. 3.

Predicting eventual victory in the St. Louis strike, Richard T. Frankensteen said for the union, "we have 10 ways in which we can close Ford completely." Union members in the recently reopened Kansas City branch of the Ford Motor Co. have been told to be ready for a sympathy strike.

Efforts were made this week to reopen negotiations with General Motors Corp. for revision of its contract with the union. Union officials indicated that they would demand the corporation's promise to discipline foremen and superintendents who failed to live up to the contract, in return for a guarantee against unauthorized strikes. GM president, W. S. Knudsen, has expressed willingness to resume negotiations if the union would renew assurances against outlaw strikes. The corporation's position on the union's new demand is not known but it is expected that the corporation will insist that the grievance procedure provided in the contract is adequate for handling complaints against the conduct of plant executives.

The Fisher Body plant in Pontiac, which had been closed by a five-day sitdown strike that ended Nov. 22, began operating Friday, Nov. 26, in some departments. Full production was resumed on Monday when the Pontiac car plant, which had been closed for lack of bodies, also resumed. By Tuesday, both plants were back in full production, returning more than 14,000 men to work after a 10-day shutdown.

Company officials and union representatives were meeting this week to settle differences which led to the strike.

Meanwhile in Detroit, Wednesday, hearings were opened in another case involving union workers dismissed by the Fisher Pontiac plant for what is known as the tar barrel incident. Six union workers were discharged last June after a non-union man had been dipped in a barrel of plastic material. After carrying the case through the entire grievance procedure provided in the contract of March 12 between the corporation and the union, both sides agreed to submit the matter to an arbitrator and Willard E. Hotchkiss, former president of Armour Institute, was chosen as umpire. This is the only case that has been carried through the entire grievance procedure and is said to mark the first time that such mediation of dispute has been arranged in major automobile circles.

At the Chrysler plants where 10,000 workers were laid off and a four-day week instituted as result of restricted production schedules, the union is attempting to extend a share-the-work program by urging adoption of a 28-hour week instead of 32 hours. Votes taken at the various Chrysler locals are said to have strongly favored the work-sharing plan.

The Wilcox-Rich division of Eaton Mfg. Co., this week, served notice on the UAW that "any future stoppage of work without resorting to the outlined procedure of collective bargaining will call for discharge of any and all employes responsible for such stoppage."

The company's Saginaw plant had been tied up a week by strike, called by the local shop committee over a controversy involving payment of dues, a matter in which the company had no interest and involving no grievance against the management.

In a letter to Homer Martin, general manager R. H. Daisley reminded the UAW that the collective bargaining agreement signed May 20 last, stipulated there would be no stoppages of work until all means of negotiation had been exhausted. "The difficulty just experienced," the letter continued, "was one caused by the local union officers and the shop committee refusing to be guided by their international union officers and representatives. We deplore, as you do, the irresponsible acts of individuals resulting in the idleness of many workers due to misunderstandings either trivial in nature or, as in this case, one in which the company is not directly involved or actually interested."

Daisley pointed out that the present agreement does not call for a so-called closed shop and that the company's policy in this respect has not changed. "Nobody has to join any organization," he said, "to obtain or keep a job in our plants. Nobody has to refrain from joining any organization to obtain or keep a job in our plants."

He placed upon the international union the responsibility for seeing that the locals with which the company is dealing will act in the future in a responsible manner and enforce the terms of "our agreement" so that a true spirit of collective bargaining will result. "It is with this understanding that we will reopen our Saginaw division for operations on Tuesday, Nov. 30," Daisley's letter concluded.

"Which Way?"

(Continued from page 791)

ords of previous upswings and that commercial history shows this to happen before change in trend takes place, Mr. Sloan said. "There is available a tremendous latent demand on the part of the masses for more goods and services to add to the comforts and pleasures of life and make possible a higher standard of living for all. This is true not only because of the shortage still resulting from the depression, but from the more fundamental standpoint as well."

Mr. Sloan's suggestions for meeting the problem of "What are we going to do about it?" make up a significant document which will be treated in detail in AUTOMOTIVE INDUSTRIES, issue of Dec. 11.

. . . slants

PASS THE SALT—*As the freighter* George M. Humphreys *moved slowly down the St. Clair river, Captain William Haydet, the skipper, squinted through his binoculars at a 1938 Pontiac eight four-door sedan parked on the dock at Marine City, Mich. His survey finished, the captain reached for his megaphone and shouted to an enterprising Pontiac salesman standing with the car on the dock, "It looks all right to me.*

I'll wire you from Toledo." (Mrs. Haydet—apparently not a whit less enterprising than the salesman—had arranged for the over-the-water sale.)

DEAD DOORS — *"Blind-fold" tests were recently conducted in a sound-proofed room to demonstrate the effectiveness of the spray-on type of insulation used on the door and rear deck panels of the* 1938 *DeSoto cars. Two doors of identical construction were suspended from the ceiling of the test room, one treated with the ordinary type of sound-proofing material, the other with the new asphalt spray. While blind-folded observers strained their ears, a DeSoto engineer thumped one door, then the next with a heavy hammer. All observers singled out the door treated with the new material as the "deadest" door.*

Underwood & Underwood

PLANE PAPOOSE This invention of Major R. H. Mayo, technical general manager of Imperial Airways, is reported ready for trial flights at the seaplane yards of Short Bros., Rochester, Kent, England. The unique "pick-a-back" arrangement is intended to enable the smaller airplane to fly with a greater load than it could rise with from land or water with fuel and pay loads on Atlantic crossings.

Parts Industry Ranks Fourth

Ranking fourth in a list of 20 large employing industries surveyed by the Bureau of Labor Statistics, the automobile parts industry paid an hourly entrance wage rate of 55.4 cents in July of the present year, compared with average rate of 51.2 cents for all the industries.

The highest rate was 61.1 cents, paid by the petroleum refining industry. Between this and the automobile parts rates were iron and steel, 58.5 cents, and slaughtering and packing, 56.7 cents. Only 2.9 per cent of the employes in the automobile parts industry received less than 40 cents an hour. The average hourly entrance wage rate of 48.1 cents was paid by the rubber tire and inner tube industry.

The figures are taken from the twelfth annual common-labor survey of the bureau which will shortly be released. They cover 5238 establishments with 222,555 common unskilled laborers on their payrolls at entrance rates.

SAE to Discuss Production

The National Production Meeting of the Society of Automotive Engineers begins in Flint, Mich., on Dec. 8. Sessions will run through Dec. 10 and will be held at the Durant Hotel.

Special attention will be given to forging, welding, finishing, planning, machining, and spline and gear production in ten papers to be presented at the five technical sessions. Abstracts of these papers will be published in AUTOMOTIVE INDUSTRIES, issue of Dec. 11.

A.S.I. Show Opens Dec. 6

On Dec. 6 the Automotive Service Industries Show will open for a six-day exhibition at the Chicago Navy Pier. Preliminary vital statistics give the information that 372 manufacturers and their representatives will be on hand, and over 1000 booths used for merchandising and sales promotion displays.

A complete report covering the A.S.I. Show will be published in AUTOMOTIVE INDUSTRIES, issue of Dec. 11.

New Passenger Car Registrations*

	October 1937	September 1937	October 1936	TEN MONTHS 1937	TEN MONTHS 1936	Per Cent Change, 10 Months, 1937 over 1936	Per Cent of Total Ten Months 1937	Per Cent of Total Ten Months 1936	TWELVE MONTHS 1937 Models	TWELVE MONTHS 1936 Models	TWELVE MONTHS Per Cent Change
Ford	35,028	48,330	44,575	712,277	651,509	+ 9.3	23.15	23.04	803,338	762,686	+ 5.2
Chevrolet	45,209	55,232	27,382	655,952	779,403	− 15.6	21.32	27.56	799,605	900,624	− 11.1
Plymouth	23,840	29,817	29,929	408,639	406,882	+ 0.3	13.28	14.39	498,042	469,734	+ 6.0
Dodge	16,459	16,261	14,396	227,427	204,399	+ 11.0	7.39	7.23	269,665	237,275	+ 13.8
Pontiac	13,525	14,289	6,577	187,676	138,129	+ 36.0	6.10	4.88	219,776	160,549	+ 37.0
Buick	15,714	11,246	8,615	169,950	122,235	+ 39.0	5.52	4.32	207,635	147,138	+ 40.8
Oldsmobile	10,547	11,001	3,811	166,308	152,774	+ 8.9	5.40	5.40	190,626	180,342	+ 5.9
Packard	5,466	4,614	8,297	84,089	53,696	+ 56.2	2.73	1.90	98,586	62,349	+ 58.2
Chrysler	6,835	6,753	2,512	78,584	46,057	+ 70.7	2.55	1.63	90,905	50,737	+ 79.1
Terraplane	3,360	4,489	3,358	66,958	64,325	+ 4.0	2.18	2.27	80,536	74,324	+ 8.3
De Soto	4,736	5,370	2,376	64,640	35,634	+ 81.6	2.10	1.26	73,805	39,393	+ 87.5
Studebaker	4,721	4,284	7,040	61,810	55,062	+ 12.2	2.01	1.95	74,113	61,028	+ 21.5
Nash	2,907	3,818	2,039	61,134	33,930	+ 80.1	1.99	1.20	69,536	39,204	+ 77.2
Willys	3,035	3,476	969	46,474	10,731	+332.0	1.51	.38	48,156	12,942	+272.0
La Salle	2,105	1,805	499	25,312	9,476	+167.0	.82	.33	29,784	11,668	+156.0
Lincoln	1,321	1,734	1,748	21,655	11,704	+ 85.0	.70	.41	25,419	12,676	+101.0
Hudson	808	790	944	13,099	17,340	− 24.5	.43	.61	16,485	21,508	− 23.5
Graham	895	1,228	1,044	12,489	13,767	− 9.1	.41	.49	15,027	15,599	− 3.7
Cadillac	600	634	611	9,910	9,372	+ 5.8	.32	.33	12,264	11,557	+ 6.0
Cord	49	79	91	1,092	1,034	+ 5.8	.04	.04	1,230	1,034	+ 19.0
Hupmobile	108	40	.....	171	.....	.....	.01	.....	171	.....	.....
Pierce-Arrow	2	3	61	152	682	− 77.7	.....	.02	252	838	− 69.9
Auburn	1	.....	62	145	1,708	− 91.7	.....	.06	280	2,216	− 87.5
Miscellaneous	120	149	578	1,191	8,360	− 85.7	.04	.30	2,796	10,310	− 73.0
Total	197,391	225,442	167,534	3,077,134	2,828,209	+ 8.9	100.00	100.00	3,628,012	3,285,731	+ 10.6
Chrysler Corp.	51,870	58,201	49,213	779,290	692,972	+ 12.6	25.33	24.50	932,417	797,139	+ 17.0
Ford and Lincoln	36,349	50,064	46,323	733,932	663,213	+ 10.8	23.85	23.45	828,757	775,362	+ 7.0
General Motors	87,700	94,207	47,495	1,215,108	1,211,389	+ 0.2	39.49	42.83	1,459,690	1,411,878	+ 3.3
All Others	21,472	22,970	49,213	348,804	260,635	+ 34.0	11.33	9.22	407,148	301,352	+ 35.2

* Less Wisconsin for July, August, September, and October.

Business in Brief

Written by the Guaranty Trust Co., New York

Recession Slackens

While business showed no definite improvement last week, signs appeared in some directions that the rate of recession had at least become less rapid. Retail sales in many localities were reported to be larger than in the preceding week, partly on account of colder weather and partly because of more active holiday buying. In comparison with the figures a year ago, retail sales last week, according to Dun & Bradstreet, showed gains from 2 to 10 per cent. The business index of *The New York Times* for the week ended Nov. 20 stands at 88.9, as against 90.5 for the preceding week and 104.7 a year ago.

The index of business activity of the Guaranty Trust Co. for October stands at 87.3, as compared with 93.8 for September and 91.0 for October, 1936. The Guaranty Trust Co.'s wholesale price index for Nov. 15 stands at 69.5 per cent of the 1926 average, as against 77.9 a month earlier and 77.0 a year earlier.

Freight Loadings Lower

The decline in the movement of railway freight continued during the week ended Nov. 20. Loadings in that period totaled 647,251 cars, showing a decrease of 42,363 cars, or 6.1 per cent, below the total for the preceding week, one of 142,521 cars, or 18 per cent, from that for the corresponding period last year, and one of 673 cars, or 0.1 per cent, below that for the similar week two years ago.

Production of electricity by the electric light and power industry of the United States for the week ended Nov. 20 was 2.5 per cent larger than in the corresponding period last year. This was the first time in four weeks that an increase was reported in the margin of gain above the 1936 figures.

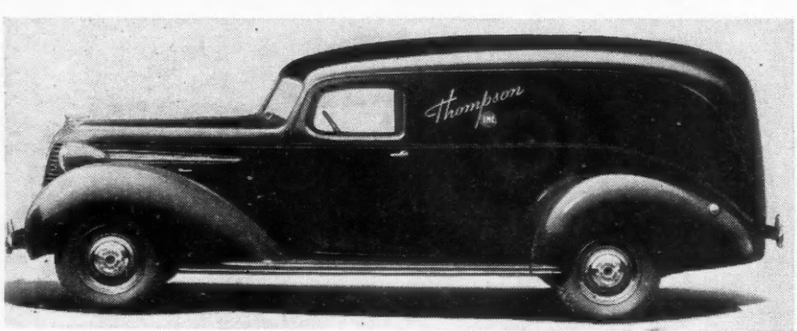
Cash farm income in October showed less than the usual seasonal increase above the September total but was $25,000,000, or 3 per cent, greater than a year earlier, according to the Department of Agriculture. The total farm income for the first ten months of the year was 10 per cent larger than a year ago.

Crude Oil Output Gains

Average daily crude oil production for the week ended Nov. 20 was 3,573,850 barrels, showing a gain of 32,400 barrels above the output for the preceding week. The current figure is, however, only moderately in excess of the 3,509,000 barrels calculated to be the total of the restrictions imposed by the oil-producing States for November.

Professor Fisher's index of wholesale commodity prices declined another full point last week and now stands at 85.1 per cent of the 1926 average, as against 86.1 a week ago, 87.1 two weeks ago, 87.9 three weeks ago, and 88.1 four weeks ago.

Federal Reserve bank credit outstanding increased $6,000,000 during the week ended Nov. 24 as a result of a rise of $9,000,000 in holdings of Government securities partly offset by a decline of $3,000,000 in discounts.



HUDSON'S LATEST The 1938 Hudson Terraplane custom panel delivery car, one of seven new models for commercial use. This unit is available with a wheelbase of 117 in. or 124 in. It has a capacity of 1500 lb.

Seven New Hudsons

Offer '38 Commercial Models With 102-Hp. Engine Option

Seven 1938 business cars have been announced by the Hudson Motor Car Co. The new models include a utility coach, utility coupe, custom panel delivery, cab pick-up, taxicab, station wagon, and chassis with cab. All are mounted on the six-cylinder Hudson Terraplane chassis and provided in optional gear ratios for adaption to any commercial purpose within capacity. The 96-hp. engine is standard equipment, with 102 hp. available as an option through the use of a high-compression engine having an aluminum "super power dome" cylinder head.

The utility coach is mounted on a 117-in. wheelbase and has a capacity of 1000 lb. The right-hand front seat and the rear seat are removable and the car can be loaded from the side and rear through the baggage compartment door. Width at the belt is 58½ in., and at the floor, 53 in. The rear load door is 29 by 44 in. A single space over 10 ft. long is available with rear seat and right front seat removed.

Exterior appearance of the utility coupe is the same as a regular passenger coupe. However, when the rear baggage door is lifted, a steel pick-up box body can be rolled out at the back of the car to provide a loading space 49¼ by 38 in. wide and 11⅝ in. deep. It is adjustable to three positions and has a tail gate. Wheelbase of this chassis is 117 in.

Two wheelbases, 117-in. and 124-in., are available for the custom panel delivery model. Capacity of this car is 1500 lb.

The cab pick-up is also offered with 117-in. and 124-in. wheelbases. The transmission for this unit has been made stronger to withstand especially severe road conditions. Steel lockers are supplied on this model which extend from the front to the rear on both sides. With the locker boxes removed, the pick-up has 47½ cu. ft. carrying capacity.

The taxicab is mounted on either the 117-in. or the 124-in. wheelbase. The larger size gives an extra 7 in. of length in the passenger compartment without reducing the room in the driver's compartment.

A number of new features have been incorporated into the 1938 station wagon which is mounted on a 117-in. wheelbase. Side curtains are kept flat in carriers which fit in space provided for the purpose back of the driver's seat. With all seats in posi-

tion, the station wagon has a capacity for eight passengers. When center and rear seats are removed, there is a load space 83½ in. long by 56 in. wide. Additional baggage can be carried by lowering the end gate. Center and rear seats are now interchangeable.

Hudson also supplies a chassis and cab unit on either the 117- or 124-in. wheelbase, permitting special body mounting. On the 1938 unit, heavier gage material is used for side rails and X members of the frame, and the rear cross member is gusseted to the side rails. Also, on this unit are a new silent straight through muffler, a heavier transmission shaft, and stronger gears.

Willys Makes Economy Record

E. G. "Cannon-Ball" Baker established a new economy record in Canada when he recently averaged 46.28 miles per Imperial gallon, driving a stock 1938 Willys sedan from Windsor to Montreal, a distance of 597 miles, according to a report just issued by David R. Wilson, president, Willys-Overland Motors, Inc. The high mileage record, made under adverse weather conditions, is equivalent to 38.56 miles per American gallon.

The test run was made under the official supervision of the Canadian Automobile Association with G. M. Shaw riding with Baker as official observer for the association.

40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

French Motor Shares

(Part 1)

American capitalists who are seeking proof of the profitableness of investment in the motor vehicle industry, should investigate the French companies already organized or organizing. In almost every instance the shares are quoted at a premium, sometimes even before the concern is fairly in operation. The oldest and largest company is a year and a half behind in orders, and on all sides facilities are being increased as rapidly as possible. Popular interest, meanwhile, continues unabated.

From *The Horseless Age*, Oct., 1897.

Diesels Gain in England

The growth in popularity of the Diesel engine in England is evidenced by the fact that 12,500 public service buses equipped with them are in operation there today compared with only 2400 Diesel-engined buses in operation three years ago, according to a report by the American Consulate General, London, made public by the Department of Commerce.

As a further example of the popularity of the Diesel in England, the report stated that of the total number of new passenger vehicles registered in England this year, 69 per cent were equipped with Diesels.

Diesel truck equipment in England has not kept pace with the passenger vehicles due to the fact that in order to avoid both taxation and speed limit restrictions there, the unladen weight of trucks must not exceed 2½ tons, it was reported. Inasmuch as the weight of the Diesel is much greater than that of the gasoline engine, truck operators do not wish to sacrifice carrying capacity with the added weight of the Diesel, according to the report.

September Output Topped By 92.5%

Statistics on passenger car and truck production in October show an increase of 107,930 units over the figure for the same month in 1936, and a gain of 92.5 per cent compared with output in September, 1937. Truck production is down 42 per cent from the September, 1937, figure, but for the first 10 months of this year shows an increase of 15.5 per cent over the production total for the similar period last year.

Passenger Car and Truck Production

(*U. S. and Canada*)

	October 1937	September 1937	October 1936	Ten Months 1937	Ten Months 1936
Passenger Cars—U. S. and Canada:					
Domestic Market—U. S.	273,753	110,122	173,930	3,161,145	2,743,939
Foreign Market—U. S.	24,909	8,549	16,312	215,005	159,139
Canada	7,378	1,926	4,448	124,454	102,326
Total	306,040	120,597	194,690	3,500,604	3,005,404
Trucks—U. S. and Canada:					
Domestic Market—U. S.	22,595	36,392	25,736	589,041	547,997
Foreign Market—U. S.	8,619	16,140	8,710	158,027	109,343
Canada	725	2,491	913	45,320	28,773
Total	31,939	55,023	35,359	792,388	686,113
Total—Domestic Market—U. S.	296,348	146,514	199,666	3,750,186	3,291,936
Total—Foreign Market—U. S.	33,528	24,689	25,022	373,032	268,482
Total—Canada	8,103	4,417	5,361	169,774	131,099
Total—Cars and Trucks—U. S. and Canada	337,979	175,620	230,049	4,292,992	3,691,517

Passenger Car Production by Wholesale Price Classes

(*U. S. and Canada*)

	Ten Months 1937	Ten Months 1936	Per Cent Change	Per Cent of Total 1937	Per Cent of Total 1936
Under $500	1,558,849	1,634,965	− 4.7	42.49	52.79
$501 to $750	1,751,444	1,233,470	+42.0	51.88	42.49
$751 to $1000	152,661	94,217	+61.9	4.52	3.25
$1001 to $1500	25,517	30,265	−15.7	.76	1.04
$1501 to $2000	9,161	8,663	+ 5.9	.27	.30
$2001 to $3000	2,760	3,561	−22.5	.08	.12
$3001 and over	212	263	−19.3	.....	.01
Total	3,500,604	3,005,404	+16.8	100.00	100.00

Truck Production by Capacities

(*U. S. and Canada*)

	Ten Months 1937	Ten Months 1936	Per Cent Change	Per Cent of Total 1937	Per Cent of Total 1936
1½ Tons and less	737,974	636,222	+16.0	93.13	92.73
2 to 3 Tons	32,615	33,577	− 2.8	4.11	4.89
3½ Tons and over	11,537	7,102	+62.5	1.46	1.04
Special and buses	10,262	9,212	+11.1	1.30	1.34
Total	792,388	686,113	+15.5	100.00	100.00

Automotive Metal Markets

Sentiment Improves as Mills Report Turn for Better; More Active Demand Expected in Early 1938

Sentiment in the metal markets has turned a shade more cheerful. Middle West finishing mills report a mild turn for the better in releases from automotive steel buyers. While the American Iron & Steel Institute estimates this week's ingot production at only 28.8 per cent of capacity, the lowest rate in three years, sectional statisticians show that recovery has begun in Cleveland, Chicago and some of the other steel production centers. A conservative estimate of finishing mill operations is 35 to 40 per cent of capacity.

Like in Wall Street, there comes in all recessions in the steel market a time when it is felt that the bad news is out and from then on there is usually constructive improvement. This stage appears to have been definitely reached. December, more often than not an off-month in steel-buying is not looked for to bring much of a change into the picture, but a start toward more active demand in the new year is confidently looked for to manifest itself.

In the non-ferrous section of the market, liquidation appears to have run its course. Zinc producers took the bull by the horns and announced a few days ago a $5 per ton reduction in prime western grade prices with the avowed intention of stimulating buying by consumers. This came as somewhat of a departure from the usual motivation for price reductions in the past month, these having been nearly always based on market declines abroad. Virtually all of the non-ferrous metals: copper, tin, and lead have for so long been under the full sway of foreign cables that the step taken by the zinc producers exerted a healthy influence on the market as a whole.

European metal traders have for weeks expressed surprise in letters to their American correspondents at the exaggerated susceptibility of our markets to the undercurrents of those of Europe and at the lack of a more independent policy with reference to our domestic market. In spite of a 4 cents per lb. duty on copper, the price of that metal in the last few months has been made, more often than not, solely by the ups and downs in London.

The so-called "export" price crossed the 10-cent line early this week, indicating a rise of approximately $5 a ton over the preceding week's closing quotation. European buyers were reported to be making large tonnage purchases. Aside from enhancing confidence among producers, the effect of the foreign improvement, for once, failed to register here, sales by producers as well as customs smelters continuing light, with the quotation unchanged at 10¾ cents, delivered Connecticut, further fractional downward revision of price ensuing on Wednesday.

Sales of small tonnages of spot Straits tin at 42 cents at the beginning of this week were followed by successive, fractional advances, which resulted in 42½ cents being chalked up on Tuesday. A month ago 48¼ cents and a year ago 52½ cents was the price. London and Singapore appear to be disposed to bid prices up, but the gap in American consumption, caused chiefly by the recession in automotive activity, acts as a damper on bullish sentiment abroad.

Demand for lead is backward and the market barely steady.—W. C. H.

Plymouth Trucks

1938 Models Include Sedan, Pick-Up Truck, and Chassis With Cab

Announcement of its line of commercial cars for 1938 has been made by the Plymouth Division of the Chrysler Corp. Three different models are offered: a commercial sedan with 105 cu. ft. capacity, a commercial pick-up truck with all-steel express box body, and a commercial car chassis with cab. Production on the new line is under way, and sample cars have been shipped to dealers throughout the country.

All models are mounted on a commercial car chassis of 116-in. wheelbase. The frame has side channels six inches deep and five cross-members, including rear engine support cross-member.

The engine used is the Plymouth L-head design, which delivers 70 hp. at 3000 r.p.m. The transmission has five ball and roller bearings; rear axles are of the hypoid type.

In the commercial sedan, the load compartment is open behind the driver's seat and is accessible from the front for side unloading, or through a steel door at the rear. Seats in all models are upholstered in leather finished fabric.

A steel express box six feet long with a floor width of 47½ in. is used on the commercial pick-up model. A low floor facilitates loading and unloading from sidewalk or ground level. The steel tailgate can be lowered and secured flush with the floor to provide additional capacity.

The chassis with cab unit consists of the Plymouth commercial car chassis, including fenders, running boards and hood, and built-in cab the same as that used on the pick-up model.

Rubber Market Better

London Committee's Export Slash Assists U. S. Manufacturers

Action of the International Rubber Regulations Committee in London, in reducing the exportable quota of crude rubber from 90 per cent to 70 per cent for the first quarter of 1938 not only has substantially bolstered a sagging crude rubber market, but will avert millions of dollars of inventory losses for American rubber goods and tire manufacturers. Crude rubber prices which have been extremely weak for several weeks, rebounded sharply when the committee's action came on Nov. 30, and have since stiffened considerably. It is now believed that crude prices in the United States will climb back to a level of between 17 and 18 cents, which American manufacturers consider to be fair.

Those manufacturers who closed their fiscal years Oct. 31 and Nov. 30 suffered severe inventory losses on crude rubber supplies, for on those dates crude prices were extremely weak. After soaring to a 10-year high of 27½ cents last March, crude prices have sagged steadily since that date, reaching a low of 14.03 cents in mid-November, and then recovering only slightly. The average price for the month of November was under 14½ cents per lb. The price averaged 16.05 cents per lb. in October. The highest monthly average was 24.21 cents in March. The average price for the first 11 months of 1937 was approximately 19.78 cents. This compares with average yearly prices of 16.4 cents for 1936, 11.4 cents for 1935, 9.8 cents for 1934, 4.89 cents for 1933 and 3.52 cents for 1932.

Last January and March due to the rapid climb in crude prices, tire manufacturers increased tire prices 6 per cent in each month. Nov. 1. despite the weakness of the crude market, manufacturers advanced prices from 1 to 6 per cent explaining that much higher priced rubber was being manufactured into tires,

which required higher price levels.

For the last half of 1937 the exportable rubber quota had been at 90 per cent. It was raised July 1 from 80 per cent because of the then upward trend of crude prices, but with the increase in the basic quota, prices immediately began to recede.

The rubber committee's action constituted the most cheering news the tire industry has had in several months. With original equipment and replacement sales below expectations for the year, and with manufacturers heavily stocked with crude rubber at prices far above recent market averages, most manufacturers had prepared to take heavy inventory write-down losses in their annual statements, and foresaw the possibility of severe reductions in profits. Now, however, the picture has been sharply changed for those whose years end Dec. 31, and if crude prices continue to strengthen, the profit opportunities of many companies will be restored with anticipated inventory losses converted into physical profits.

Tire Makers Resume

General and Goodyear Reopen Plants After Brief Shutdown

General Tire & Rubber Co., Akron. largest tire manufacturer not supplying the original equipment market, resumed production in all tire departments Nov. 30 after nearly a week's shutdown for inventory. Approximately 750 employes have been recalled.

The company's schedule calls for four and five six-hour days per week. Its Akron plant has a capacity for production of more than 6000 tires daily.

Goodyear Tire & Rubber Co., which has kept its plant No. 2 in Akron closed since the three-day sitdown strike of two weeks ago, has resumed production but probably will not operate the plant more than six days during the month of December. The company has completed its layoff of 1600 men, making a total of 3300 Goodyear workers dropped within an approximately two months' period.

Efforts will be made, after the first of the year, officials indicate, to bring production up to the point where remaining employes can average at least 24 hours of work per week.

Goodyear has slackened production considerably in its plants at Jackson, Mich., Cumberland, Md., and Gadsden, Ala.

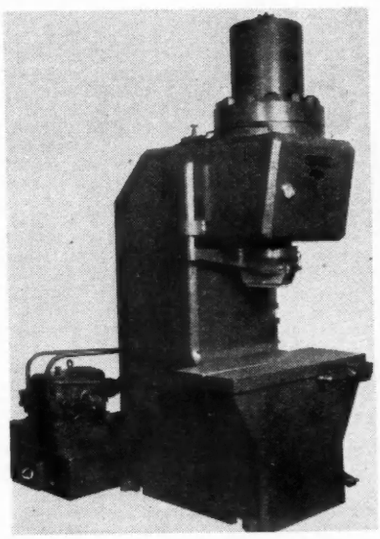
TOOLS OF TOMORROW

Straightening Press

. . . for handling front axle I-beams for heavy trucks and buses.

Large front axle I-beams for heavy trucks and buses can be straightened on the new style 200-ton "Gooseneck" straightening press designed and manufactured by the Oilgear Co., Milwaukee, Wis.

The press frame and motor mounting are of allsteel welded construction from plates welded together into a unit and normalized. Plates up to 3-in. in thickness are used in the main section of the frame.



Oilgear press for straightening large front axle I-beams for heavy trucks and buses.

The ground and polished press ram is fitted with molded packing and guided in a yoke liner and long bronze bushing. A 13½-in. bore hat type steel cylinder with closely fitted ring type piston is flanged to the top of the press. Two seamless steel tubes brazed to flanged type joints connect the pump and cylinder, no control valve being required. The ram is fitted with a sliding ram nose to expedite straightening of special parts.

As stated by the manufacturer, the ram motion is always under the instant control of the operator, regardless of resistance met. Both the speed and stroke of the ram can be preset or selected at will from zero to maximum. Full tonnage is available at all speeds and the power required is always in proportion to the resistance met.

Fluid power up to 2500 lb. per sq. in. is supplied by the Oilgear two-way variable displacement pump. It will provide a maximum ram speed down of 38 in. per min., and a maximum ram speed up of 76 in. per min. at pressures up to 2500 lb. per sq. in., depending upon the resistance met.

Other specifications of this press are: stroke, maximum, 12 in.; daylight, end of ram to table, 26 in.; depth of throat 12 in.; width of table, 18 in.; length of table, 50 in.; height of table from floor, 36 in.

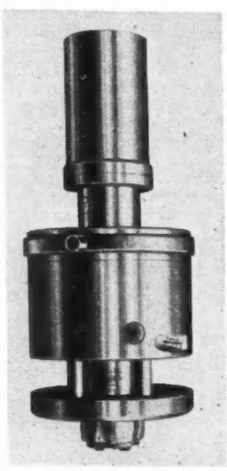
Collapsible Tap

. . . new Landis model is of the receding chaser type.

The line of collapsible and receding chaser collapsible taps made by the Landis Machine Co., Waynesboro, Pa., has been augmented by a new tap of the receding chaser type, designated as the Landis 3AIM. It is made of high carbon steel and all parts are heat treated and precision ground. All surfaces liable to wear from sliding contact are hardened. The 3AIM taps may be applied to any machine employing a live spindle and where the resetting action is done automatically. There is no manually operated model.

The internal mechanism of the tap employs a cross rail slide cam to control the taper. It is possible to trip the tap at any position by adjusting

(Turn to page 820, please)



New Landis collapsible tap of the receding chaser type.

AUTOMOTIVE ABSTRACTS

Pilot Injection in Diesel Engines

One of the objectionable features of Diesel engine operation is the socalled Diesel knock, which is dependent on the delay period, that is, on the time that elapses between the beginning of injection and the actual ignition of the fuel. A number of different methods have been proposed to shorten the ignition delay, one being the use of doped fuel and another the injection of a small pilot charge ahead of the main charge. This last method has been investigated experimentally by D. Jäfar at Birmingham University, England, on a Tangye single-cylinder four-stroke oil engine of 4⅜ by 5¾ in. bore and stroke with a normal speed of 1200 r.p.m. Two Bosch fuel pumps and two injection nozzles were fitted, one set of injection apparatus serving as the main and the other as the pilot set. The timing of both pumps could be varied through a wide range and very accurately adjusted by means of micrometer screws. A special cylinder head was made to take the two nozzles, and the combustion chamber was an open type one. Injection timing was indicated by means of a neon-lamp idicator. Noise was measured by means of an M. L. noise comparator. Both the quantity and the timing of each charge could be varied.

The results showed that in some cases there was a marked improvement in both the torque and the smoothness of operation. With certain angles of pilot-injection advance the ignition delay of the main charge was reduced practically to zero. So far as smoothness of running was concerned, at 1200 r.p.m., the best quantity delivered by the pilot pump was found to be 0.177 x 10-4 lb. per cycle or 21.75 per cent of the main charge. The best timing of the pilot charge was found to be between 40 and 50 deg. ahead of top center.

Cylinder diagrams were taken with injection of the main pump beginning at top center, 4 deg. ahead of top center, and 11.5 deg. ahead of top center, and with injection by the pilot pump beginning at 0 deg., 10 deg., 60 deg. and 130 deg. ahead of top center. With the first pilot setting the combustion line was quite steep; with the second, 10 deg. advance, the diagram began to smooth out, while with the third setting, 60 deg. advance, the diagram was completely smooth, there being no hump or indentation in the pressure curve to mark the beginning of combustion. With a pilot-advance angle the hump in the pressure line appeared again, which is believed to be due to the fact that when the pilot charge is admitted excessively early, some of it clings to the cylinder walls and very little of it burns before the main charge is admitted. This is confirmed by the observation that the larger the quantity of the pilot charge the greater the advance angle for that charge for which the combustion curve remains smooth.

As a practical means of reducing Diesel knock the use of a special fuel-pump cam is suggested. This cam would raise the pump plunger until about 20 per cent of the main charge had been injected; then the cam contour flattens out and allows an interval of 40 deg. of crank motion before the injection of the main charge begins. Injection of the pilot charge would begin from 50 to 40 deg. ahead of top center.—*Engineering*, Oct. 15.

British "Shadow" Aircraft Industry

Not much has been heard of the "shadow-factory" system of the British Government since the scheme was introduced early in 1936. may be recalled that the plan was to set up a system of shadow factories to permit rapid expansion of the production of airplanes and aircraft engines in case of an emergency. The scheme involved the establishment of a number of new p'ants among which the manufacture of the different components was to be distributed, the plants being erected at Government expense but their operation entrusted to leading firms in the automobile industry.

On the occasion of a recent visit to England of a number of German Air Force officers, headed by General Milch, a tour of the British aircraft industry was arranged and made to include some of these shadow factories, and a number of representatives of the technical press were invited by the Air Ministry to join. This was the first intimation to the general public that the scheme was nearing fruition.

In a general way the scheme has a dual purpose, one object being to provide a part of the reserve of aircraft and engines required by the authorized expansion of the Royal Air Force, the other to give automobile firms, whose resources had been earmarked by the Committee for Imperial Defense for Air Ministry work, experience in this specialized line of work which they could apply without loss of time in case of an emergency. The new shadow factories were located as near the parent automobile factories as possible, the firms undertaking the management as agents for the Government and being paid on an agreed basis for the aircraft and engines produced. This permits aircraft manufacture and training of personnel to proceed without interference with the ordinary commercial output of the several firms, and has the additional advantage of simplifying supervision and collaboration.

The firms participating are The Austin Motor Co., Ltd., Birmingham, the Daimler Motor Co., Ltd., Coventry, Rootes Securities, Ltd., (Humber) Coventry, the Rover Co., Ltd., Birmingham, and Standard Motor Co., Ltd., Coventry. Each company manufactures certain parts for the Bristol Mercury VIII air-cooled radial engine. Two of the firms, Austin and Rootes (Humber), are undertaking the manufacture of "airframes" as well as that of engine parts.—*Engineering*, Nov. 5.

Diesel Engine Practice

In the twelfth Diesel-Engine Number of ATZ there appears an article by A. E. Thieman in which a number of changes in European Diesel-engine practice are recorded.

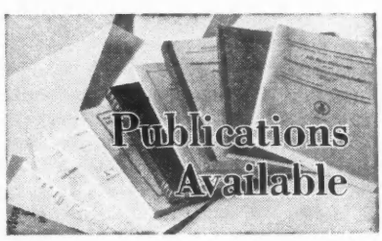
The French Berliet firm has adopted the Ricardo "Whirlpool" combustion chamber. This is a disk-shaped chamber with a diameter at least 50 per cent greater than its height and with two inlet ports in the uncooled wall of the cylinder head, which enter the chamber tangentially at an angle of 45 deg. It is claimed that the whirlpool chamber produces a sort of three-dimensional turbulence, and that as compared with the Comet combustion chamber the Whirlpool chamber gives a slightly higher b.m.e.p. and an ignition delay which is less by a few degrees of crank travel.

Compagnie Lilloise de Moteurs, which manufactures under Junkers license, has brought out automotive and railcar models of the general design of the Junkers aircraft Diesel, that is, with upper and lower crankshafts connected by spur gearing. The piston-type scavenging pump as used in the conventional Junkers engine calls for a long, multiplethrow crankshaft at the top of the engine whose bearings are highly loaded by the inertia of the heavy reciprocating masses, and this does not permit of very high speeds. A centrifugal, single-stage blower is used for scavenging and supercharging. There are six injection pumps and six nozzles on each side of the engine, consequently dual injection equipment is provided. At low speeds one set of nozzles is put out of action. The automotive engine has a bore of 2.36 in. and a stroke of 5.90 in. As a four cylinder it is said to develop 60 and as a six-cylinder 90 hp. at 3000 r.p.m. The specific weight of the six-cylinder model with flywheel and complete electrical equipment is given as 7.7 lb. per hp. For railcars the same company builds similar engines of 150, 250 and 500 hp.

John Fowler & Co. of Leeds, which firm formerly built Diesel engines under M.A.N. license, is now using a new type of turbulence chamber due to Freeman Sanders. This chamber, which is in the cylinder head, is dome-shaped and is located half over the cylinder bore and half beyond it. In the opinion of the designer, a sharp edge of the cylinder head at the entrance to the chamber is an important feature, and the suction effect as the piston moves downward produces a reversal of the swirl in the chamber. No heat-insulating insert is used in the turbulence chamber. Fuel is injected into the dome-shaped swirl chamber from one side in a broad spray of 45 deg. included angle, at 2,000 lb. per sq. in. pressure. Starting is said to be easy, and no starting aids are provided. With a bore and stroke of 4.5 by 6.25 in. and a compression ratio of 16, the engine develops a b.m.e.p. of 92 lb. per sq. in. at 1500 r.p.m.

Peugeot has acquired an Oberhänsli license and manufactures two four-cylinder models, one of 2.56 in. bore by 4.33 in. stroke which with a compresion ratio of 17 develops 35 hp. at 3500 r.p.m. and weighs 440 lb.; the other of 3.07 in. bore and 4.72 in. stroke, which with a compression ratio of 17 develops 50 hp. at 3200 r.p.m. and weighs 495 lb.

Renault has discontinued the use of direct injection through a centrally-located multiple orifice nozzle in favor of the Ricardo Comet-type head. With this cylinder head a four-cylinder 3.94 by 5.92-in. engine develops 65 hp. at 2200 r.p.m., as compared with 45 hp. at 2000 r.p.m. obtained previously with direct injection.—*ATZ*, Oct. 25.



Hobart Bros., Troy, Ohio, has brought out a new catalog on arc welding which gives data on the Hobart line of "Simplified" 40-volt **arc welding equipment.***

A new folder covering its 14-point engagement **sleeve clutch for power presses and shears** has been issued by the Niagara Machine & Tool Works, Buffalo, N. Y.*

"Engineered Instrumentation," a pamphlet just published by the Lewis Engineering Co., Naugatuck, Conn., supplies information on that company's line of **equipment for temperature measurement.***

Tanks, vats, pipe and fittings and other equipment made from **Haveg,** a molded phenolic resin asbestos composition, are described in a brochure offered by the Haveg Corp., Newark, Del.*

Two bulletins recently issued by the McCollum Hoist & Mfg. Co., Downers Grove, Ill., furnish data on the company's line of universal ball bearing spur geared hand **chain hoists** and also the universal electric hoists.*

Mechanical and chemical methods for **cleaning metal surfaces** preparatory to the application of decorative and protective coatings are discussed in a bulletin issued by the Hilo Varnish Corp., Brooklyn, N. Y.*

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

Books

of automotive interest

HOLZGASGENERATOREN (WOOD-GAS GENERATORS). *Report of a Committee on "Wood as Motor Fuel" of the Austrian Industrial Commission (Osterreichisches Kuratorium fúr Wirtschaftlickeit). Published by Julius Springer, Vienna.*

This publication is a report on a competition for small-size stationary gas generators using wood as fuel. In a preface, the Austrian Minister for Agriclulture and Forestry points out that one-third of the country is covered with forests, Austria ranking fourth among the most heavily wooded countries of the World, whereas its resources in other motor fuels, such as oil and coal, are insufficient.

In 1931, a commission was appointed to devise ways and means to extend the uses for wood, and one of the first problems attacked by this commission was the possibility of using wood as motor fuel. As Minister of Agriculture, he had attached great importance to sources of fuel for farm engine, and a competition which was organized by the commission was, therefore, limited to small stationary generators (up to a continuous output of 20 hp.). The Swiss Association for the Study of Motor Fuels collaborated in the competition. The minister points out that two of the most important points brought out by the tests are that hardwood and soft wood can be used in such generators together, and that wood with a relatively high moisture content can be used in them successfully.

The publication contains the rules of the competition and a report on the tests, which latter is divided into an explanation of the test methods, the test results, and conclusions drawn from the results. This report was written by Prof. Dr.-Ing. Hans List of Graz Technical College at the laboratories of which the tests were carried out. Then there is a report dealing with valuation of the test results, by Dr.-Ing. Ernst Manlik, and an Appendix on Extended Tests with Soft Wood in Stationary Generators, by Dr. List.

All of the generators tested are fully described and illustrated by both photographs and sectional line drawings. Test results given cover not only the performance of the generator proper but also that of the gas purifier or scrubber.

Rear Compartment Heater

A rear compartment hot-water heater is now offered as optional equipment on all Oldsmobile four-door sedans. The unit mounts on the back of the front seat and may be used independently or in conjunction with a front compartment heater.

The fan, which is controlled by a variable speed switch, draws cool air through a round grille and forces warm air out through openings at the bottom. Concealed pipes for carrying hot water from the engine are arranged so as not to interfere with the forward or backward movement of the front seat.

Wires leading to the fan motor carry a separate fuse to protect the car's electrical system.

Calendar of Coming Events

Domestic Shows

Kansas City, Mo., Automobile Show .....Nov. 27-Dec. 4
A.S.I. Show, Navy Pier, Chicago .....Dec. 6-Dec. 11

Foreign Shows

Montreal, Que., Automobile Show .....Nov. 20-27
Peru, Automobile Show, Lima, Dec. 23-Jan. 6, 1938
Leipzig, Trade Fair, March 6 to 14, 1938

Conventions and Meetings

American Standards Asssociation, Annual Meeting, New York City .....Dec. 1
MEWA Annual Convention, Chicago .....Dec. 3-4
American Society of Mechanical Engineers, New York...Dec. 6-10
Exposition of Chemical Industries, New York.....Dec. 6-11
SAE National Production Meeting, Flint Mich. ...Dec. 8-10
American Engineering Council, Annual Meeting, Washington, D. C. .....Jan. 13-15, 1938
SAE Annual Meeting, Detroit, Jan. 10-14, 1938
American Road Builders' Association, Cleveland, Jan. 17-21, 1938
American Society for Testing Materials, Spring Regional Meeting, Rochester, N. Y. March 7, 1938
SAE National Passenger Car Meeting, Detroit, March 28-30, 1938

Letters

to AUTOMOTIVE INDUSTRIES

Drill for Plastics

I notice in your issue of AUTOMOTIVE INDUSTRIES for September 25, 1937, page 425, an abstract concerning the drilling of phenol plastic materials. In this abstract, it speaks of Johns-Manville developing a drill for this work, this drill having an including angle of 55 deg. instead of the usual 118 deg.

During the summer of 1927, I had the pleasure of carrying on some work in the developing department of the Hawthorne plant of the Western Electric Co. in Chicago. I found there that the men in the drilling department ground their drills with an including angle of 45 deg. They used a standard drill with this special point, and got very favorable results, so the idea of this peculiar point of drill is nothing new.

CHARLES J. STARR
Associate in Mechanical Engineering
University of Illinois

Long Life Bearings

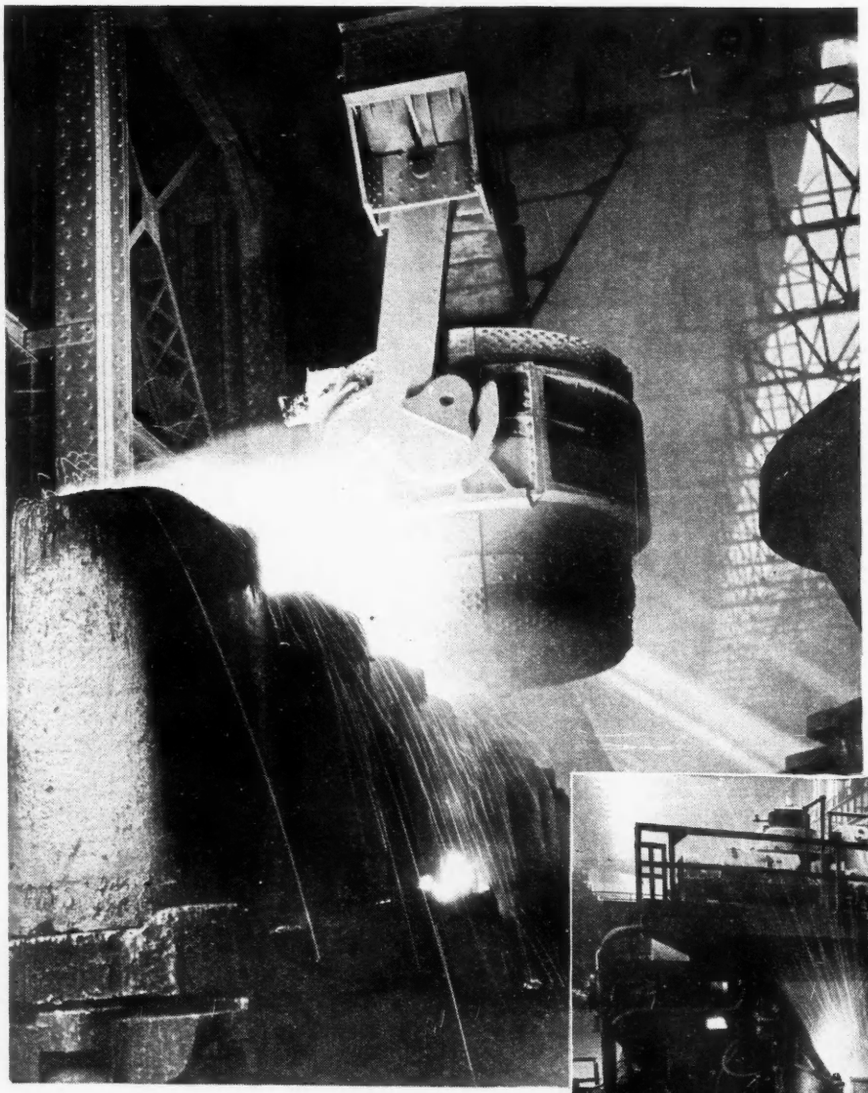
Bearings made from new alloys of copper and lead are giving continuous service for 20,000 hours and more under especially heavy-duty conditions, according to a statement recently issued by engineers of the Bohn Aluminum and Brass Corp. The report states further, that bearings of this type are being used in increased number for particularly heavy work where bearings loads are high due to severe operating conditions.

The claims of the Bohn engineers are substantiated by the performance data on the work of a Cletrac tractor used for a tough job of road grading in Oregon. This tractor, equipped with a Hercules Diesel engine, operated for 18,000 hours without a bearing requiring adjustment or replacement.

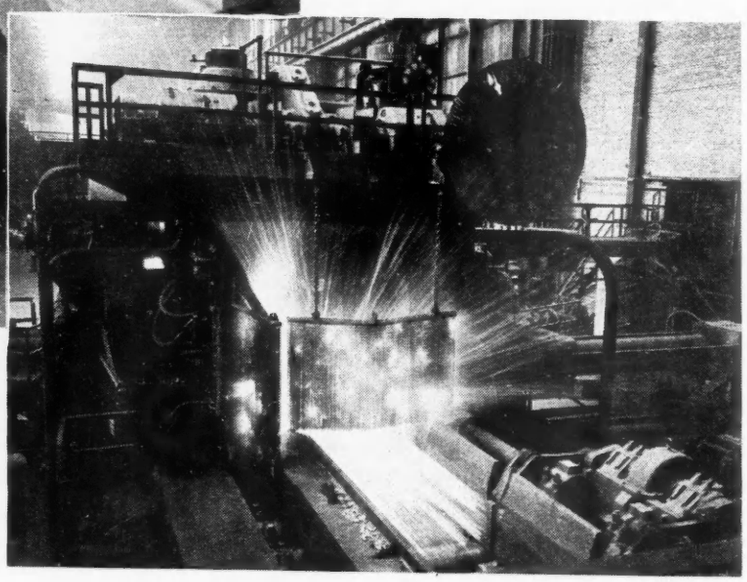
Perfect Circle Dividend

The regular dividend of 50 cents per share and 75 cents extra has been declared by The Perfect Circle Co., Hagerstown, Ind.

Combined dividends on the 162,500 shares of outstanding common stock will be paid Dec. 20, 1937, to stockholders of record on Dec. 8, 1937.



In an open hearth furnace, pig iron is mixed with scrap and other ingredients, "cooked" for approximately 11 hours, then tapped into huge ladles which a crane lifts to a point above a nearby pouring platform as seen at the left. The ladle holds 150 tons of steel or enough for many turret tops



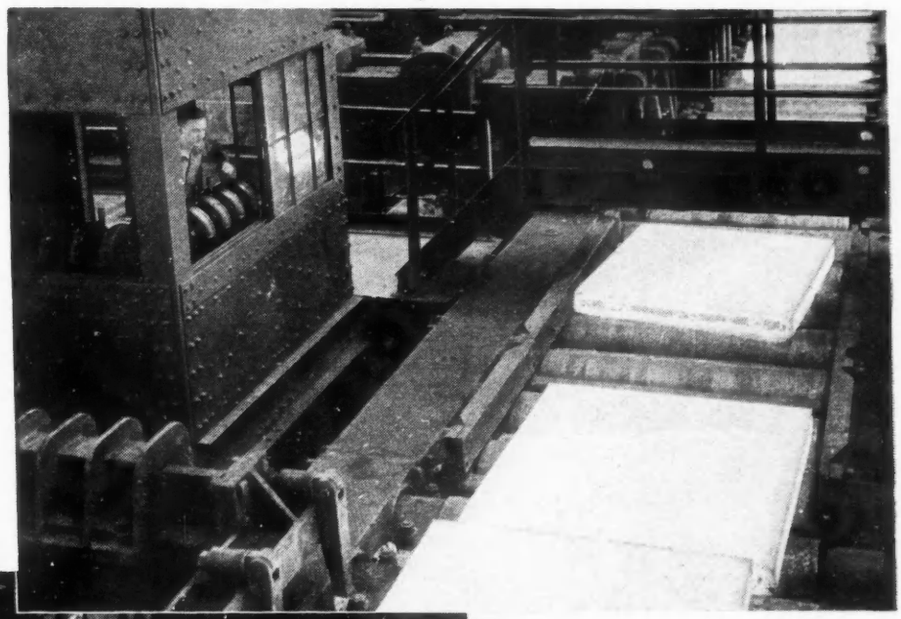
Only the rimmed or "effervescent" steel is used for the manufacture of turret tops because this grade of steel possesses greater deep-drawing properties. An ingot weighs approximately 32,000 lb. and is reheated in soaking pits to equalize its temperature for rolling into slags. At the right the ingot is seen passing through the first pass of the slabbing mill. Here the ingot is reduced to one piece 4½ in. thick, 60 in wide and 35 ft. long, by sending it back and forth through water-cooled rolls. The large dial in the photograph registers the width of the slab, the small dial its thickness, and the cylindrical dial on the vertical axis and the position of the vertical rolls with respect to the center of the mill

Photos by courtesy of the Carnegie-Illinois Steel Corp.

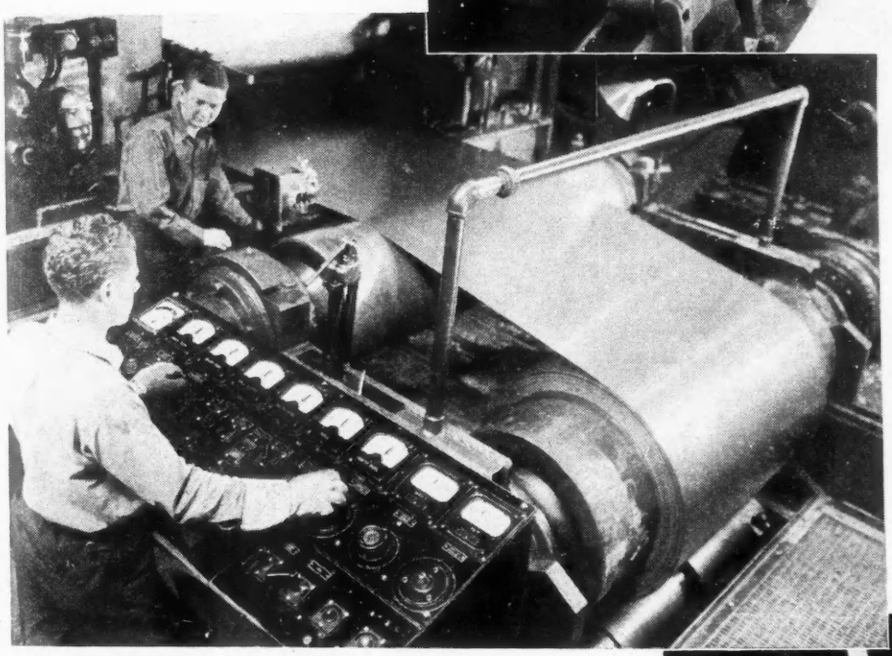
Furnace to

THIS IS THE TWENTIETH IN THE SERIES OF MONTHLY PRODUCTION FEATURES

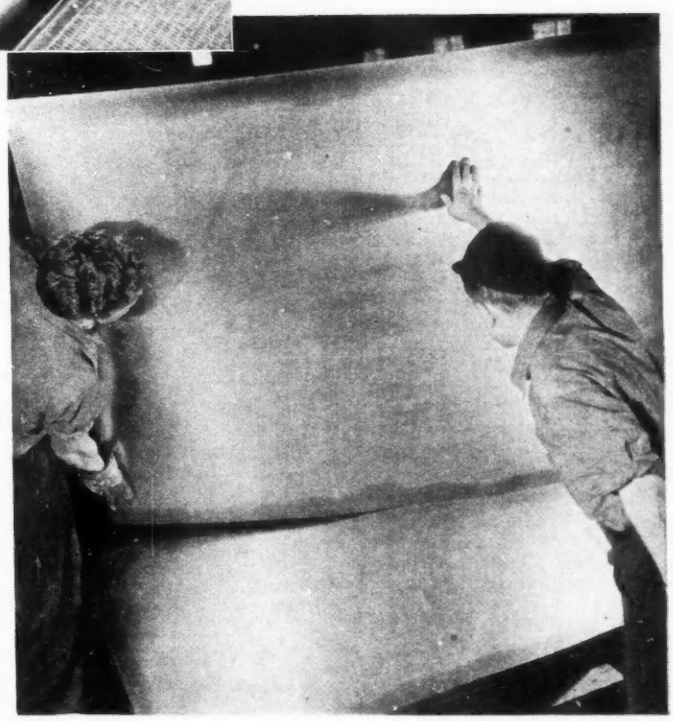
1. Furnace to Turret Top. 2. Making Timken Bearings. 3. On the Assembly Line at Willys



(Right) Next the long, thick piece is cut into slabs like those in the illustration which weigh approximately 4500 lb. each, or 56 turret tops. In this size they will best yield the length, width, and gage for finished strip for auto tops. The operator manipulates levers which control the rolls by electricity and is transporting the white hot "cakes" from the slabbing shear to the reheating furnaces where they must again be heated to uniform temperatures before passing on to be rolled into steel sheets

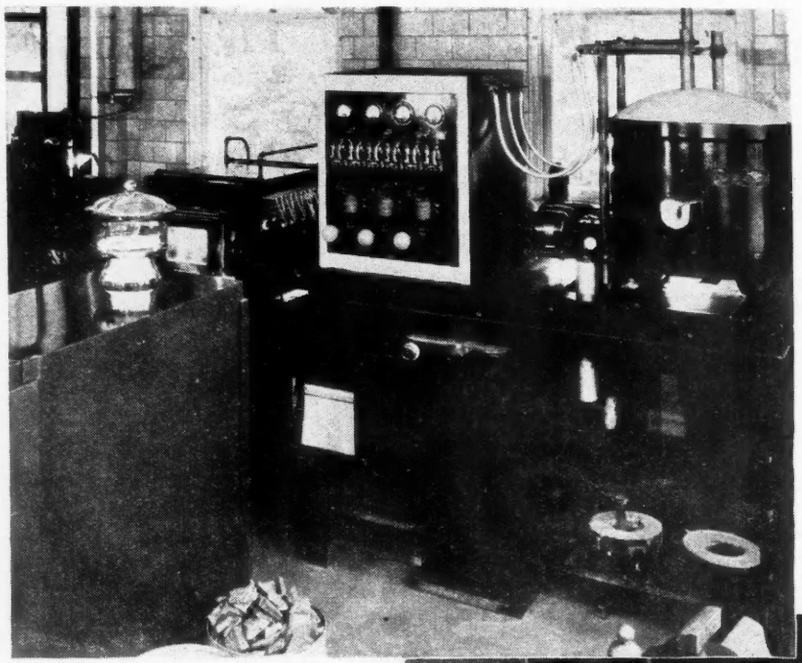


(Left) After pickling through 12 per cent hot sulphuric acid the steel is passed through four high-rolls, having a capacity of 250,000 net tons. Automatic gage control insures absolute accuracy. The elaborate control equipment seen on the rolls in the illustration is so intricate that the most intelligent of steel workers, usually college graduates, are recruited as operators. To reduce the steel when cold pressure of 2,000,000 to 3,000,000 lb. is applied. In three passes it is reduced to a thickness of 0.037 in. and length of 610 ft., the width of 69 in. remaining unchanged

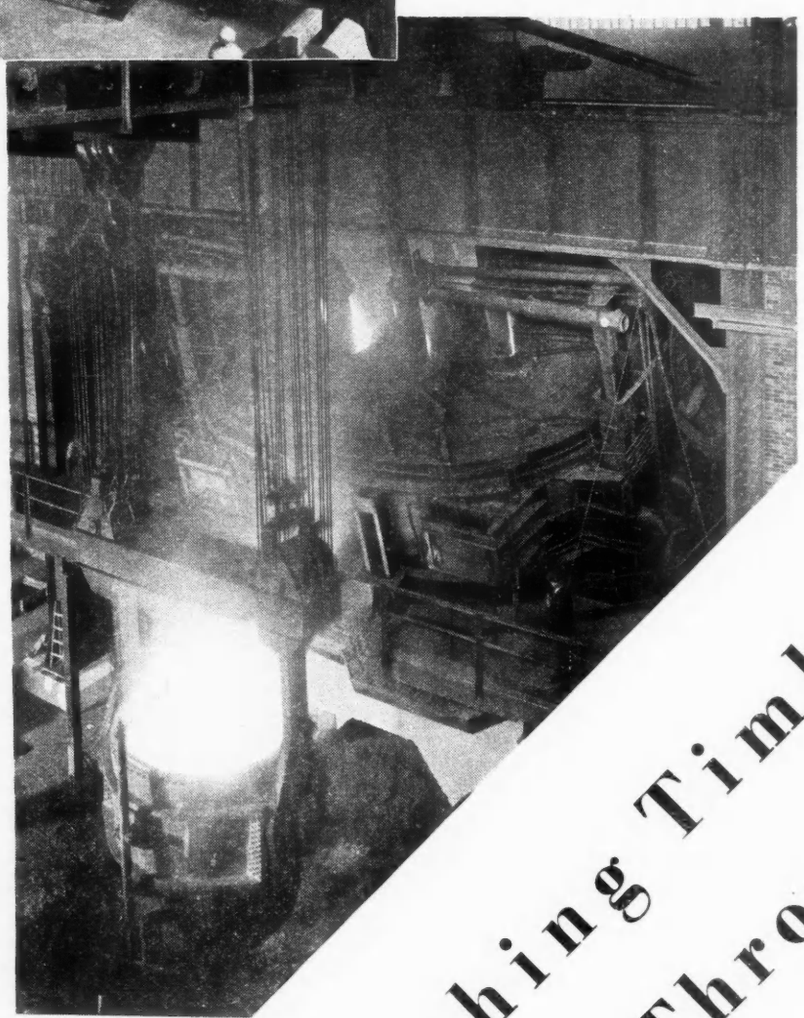


(Right) After all cold rolling operations, the coils of sheet steel are cut into the exact lengths, then annealed at 1300 deg. Fahr. Before they are released for shipment the sheets receive a final temper rolling to give them a mat-like surface with a high finish. A group of inspectors are seen giving the sheets a final inspection for width and thickness.

Turret Top



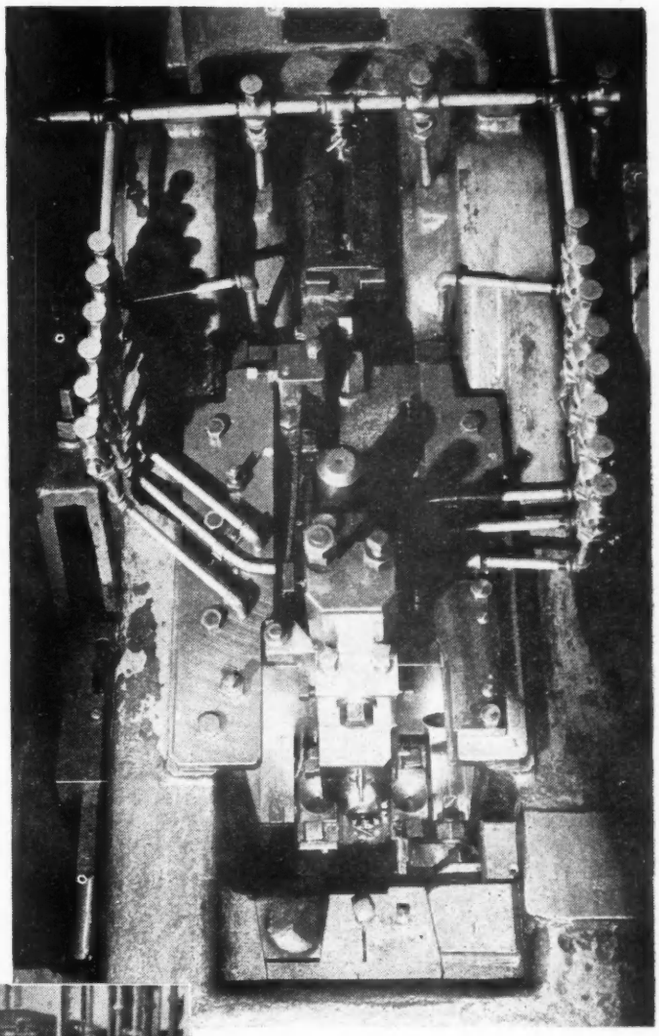
Laboratory Furnace. Before steel is made commercially it is made experimentally in the Research Laboratory in pounds instead of tons. Here we see one of the research furnaces where samples are made before production begins. Steel is checked; in pounds first, then a single ton, then 10 to 15 tons, next 30, and finally in full production



World's Largest Electric Furnace. Tapping a heat from the world's largest electric furnace, which handles 90 tons at a single heat, drawing 60,000 amperes at 250 volts. This unit is a 6 electrode Herault electric arc furnace built specially for Timken by The American Bridge Co. Timken is rated as one of the largest producers of electric furnace steel in this country.

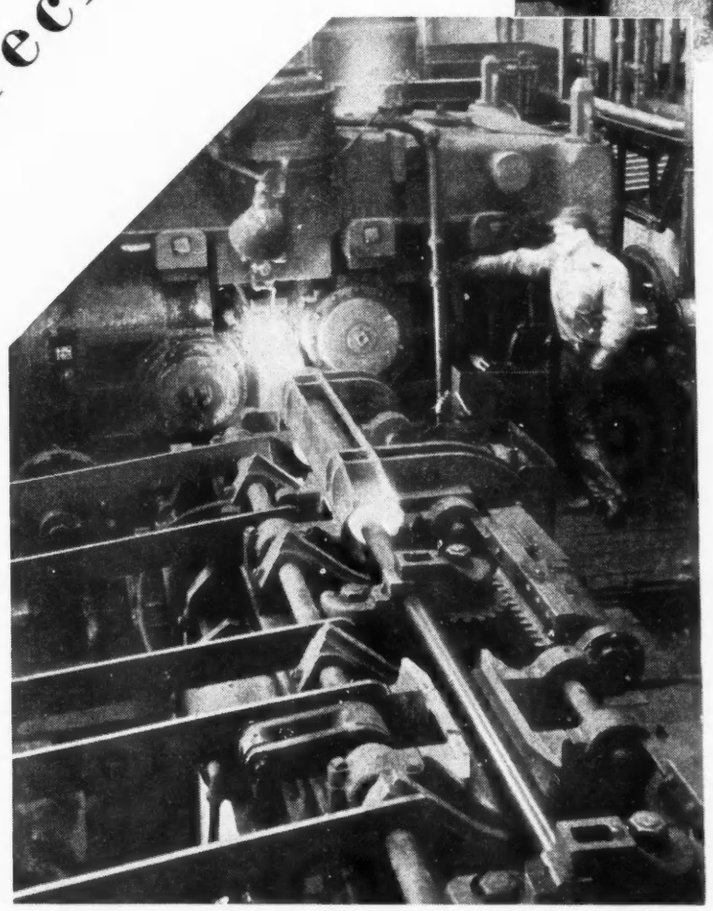
Watching Timken Through

Control Follow to Precision

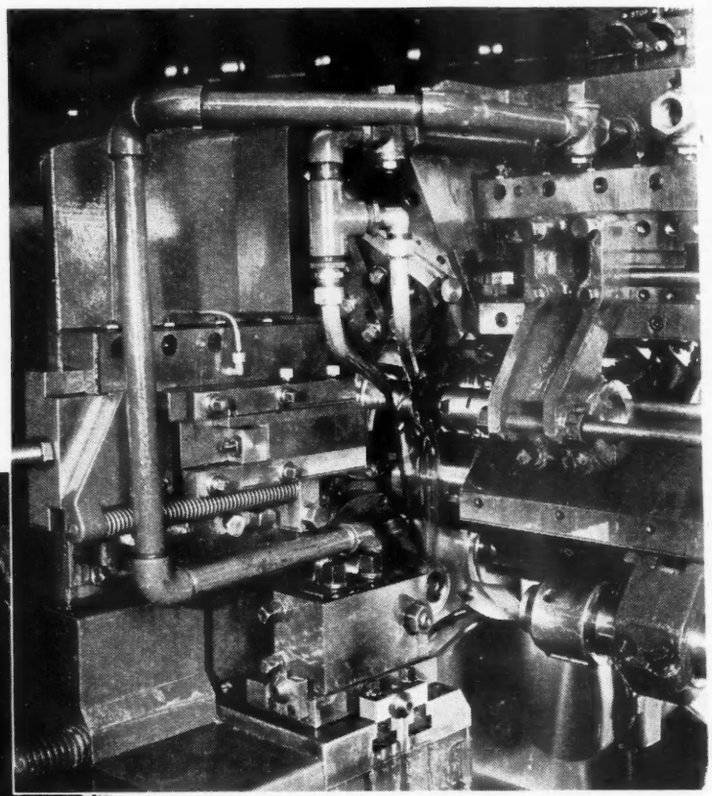


Roll Heading. Chewing wire and spitting rolls is the task of this machine, teeth and jaw of which are shown. Fed with a coil of wire, these cold headers snip off a measured length, fit it into a tapered die and forge it to shape. This machine turns out 125 rolls a minute or 180,000 a day for automotive size bearings

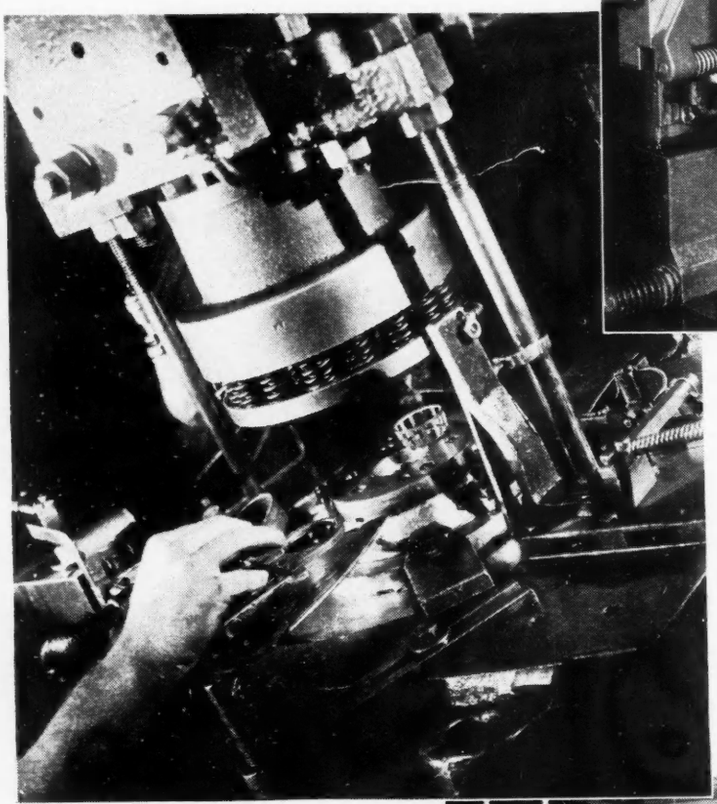
Photos courtesy of Timken Roller Bearing Co.



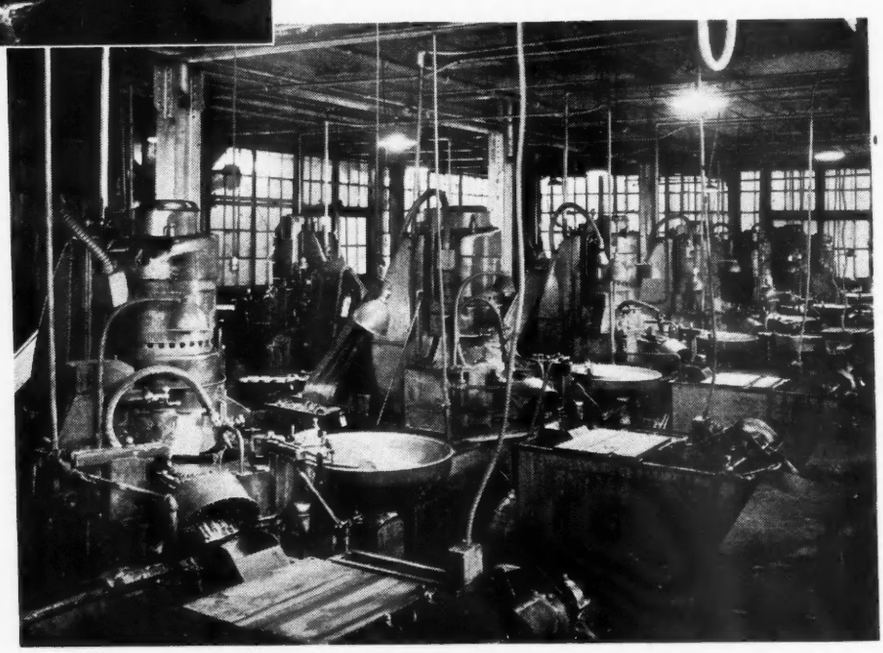
Piercing. The cups and cones of Timken bearings are made from solid billets of electric furnace alloy steel. Control of the steel is followed by equally careful control of the heating and processing, as for example in this piercing process. Heated white hot, the solid billet enters the far end of this 36-in. Mannesmann type mill, passes over a plug and mandrel between whirling rolls under heavy pressure and is literally forged into the seamless tube which is shown coming out



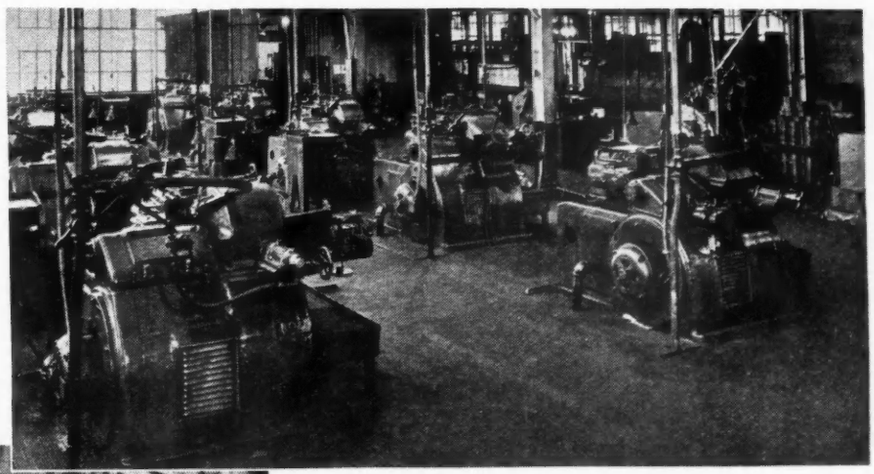
(Right) Automatic Screw Machines. These automatic screw machines—4, 5 and 6 spindle Acme, Cone and New Britain automatics—are used to shape the cones and the cups or outer races for Timken Bearings. Each machine is fed with long seamless tubes, adjusted so that the operations follow in orderly sequence. The machine shown performs 11 different operations, turning out cones at the rate of 163 an hour



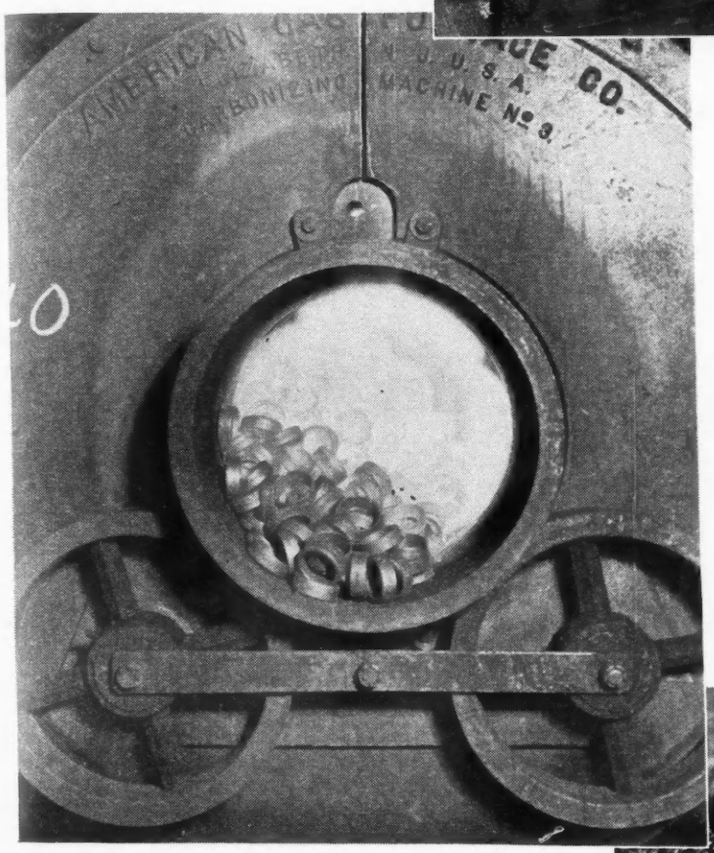
(Left) Cage Manufacture. Here we see one of the many specially designed presses which, in a series of six operations, convert strip steel into cages, slotted to receive the tapered rollers and winged to conform to the contour of the rolls. Much depends upon the accuracy of the dies and punches in these presses feeding to a multiple perforating press. Cage manufacture involves the following series of operations (1) Blank, draw and punch bottom; (2) Size; (3) Perforate; (4) "Wing" or swage (coin) pockets to fit curvature and taper of rolls; (5) Spread cage for bearing assembly (ready to place rolls and snap in position on cone); (6) Close in cage after assembly with the rolls in place



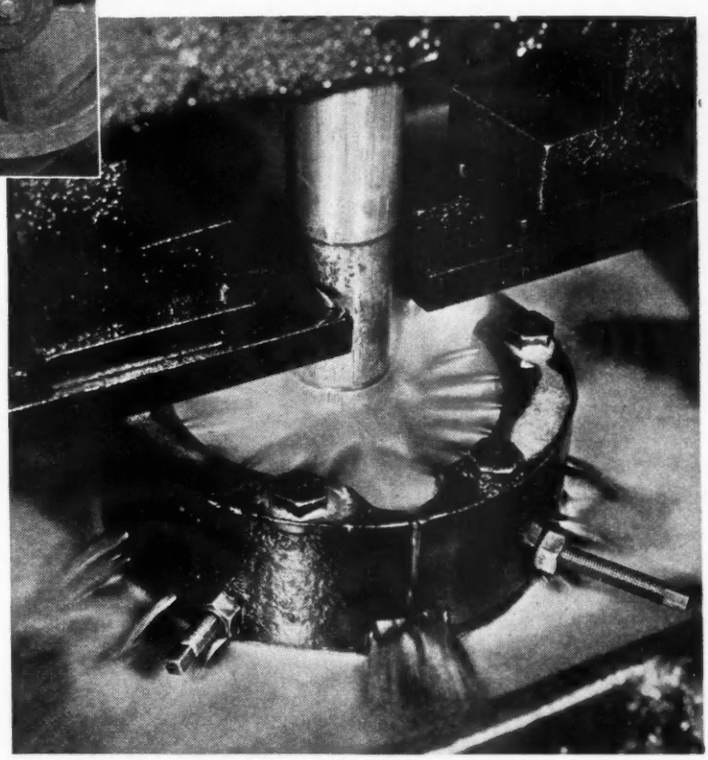
(Right) Blanchard automatic grinders used for finish grinding the faces of Timken bearing cups and cones to a tolerance of plus or minus 0.003 in. Only one face is ground at a time. The grinding wheels are automatically set to maintain a given size



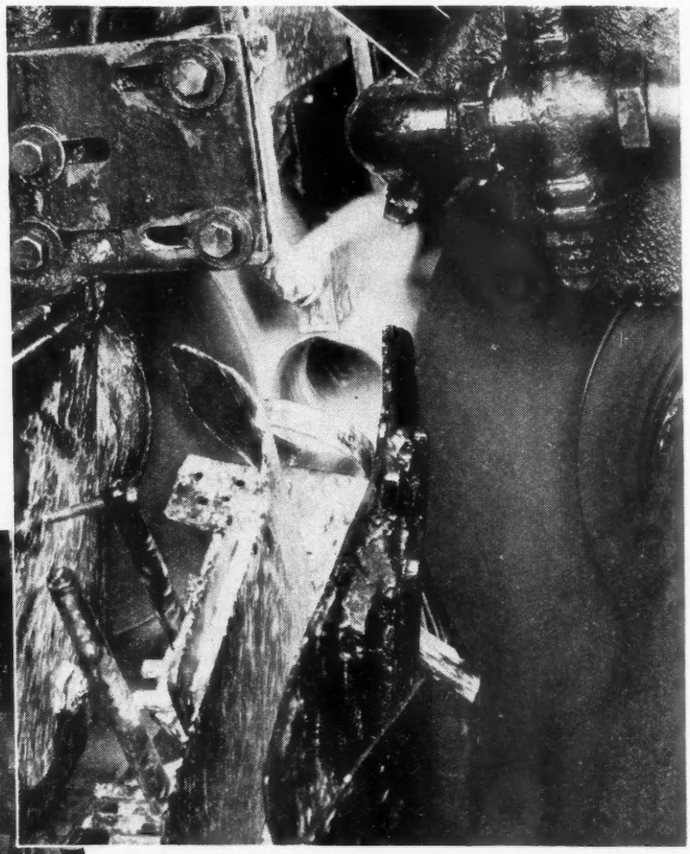
(Right) A few of the Cincinnati centerless grinders used for finishing the outside diameter of bearing cups. On the automotive sizes a tolerance of plus 0.001 in. minus nothing is allowed for the average bearing. Precision bearings for pinion applications are held to 0.0005 in.



(Left) Carburizing. From the automatic screw machines and headers, the bearing parts pass on to be carburized. Soaked at white heat in a gas rich in carbon, the bearing cups absorb this hardening element. Here they gain their protective skin, which combined with their tough resilient body gives wear. Depending upon their size, the bearing parts—cups, cones and rollers—pass through this fiery cycle under the rigid control of mechanical temperature recorders and trained metallurgists



(Right) Hardening. After carburizing, bearing parts move on to final hardening. Again the parts pass through a furnace, heated to the exact temperature which has been demonstrated to be best, and then submerged in a fountain of special oil. All sections are cooled at the same time. Rows of these quenching machines work in pairs, each with its own furnace

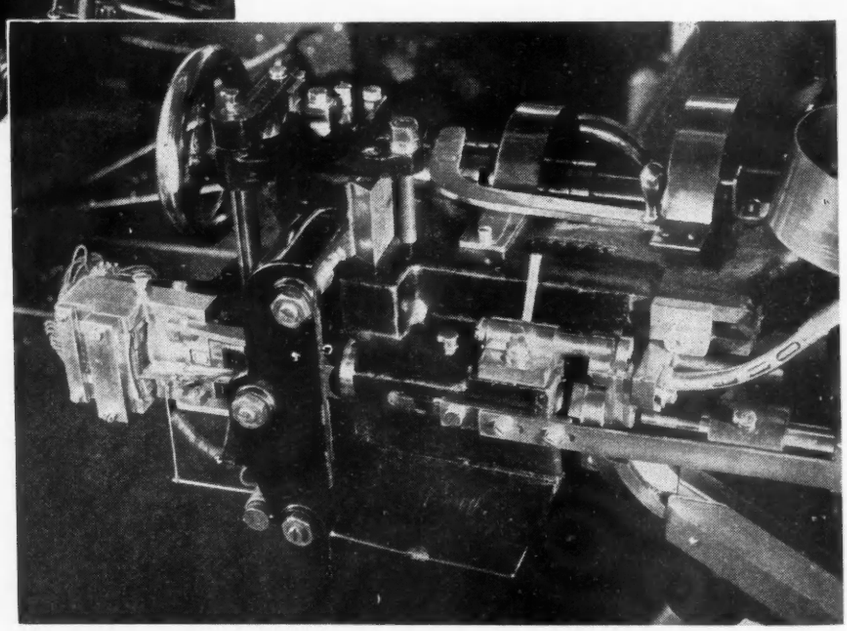


(Right) Cup O.D. Grinding. Here we see bearing cups being ground to final size, outside diameter, on a centerless grinder. Revolving in opposite directions the wheels continually work on an almost endless stack of cups, finishing them to a working tolerance of plus 0.001 in., minus nothing. Beside each machine stands a man with a gage adjusting the dressing on the grinding wheels to assure accuracy

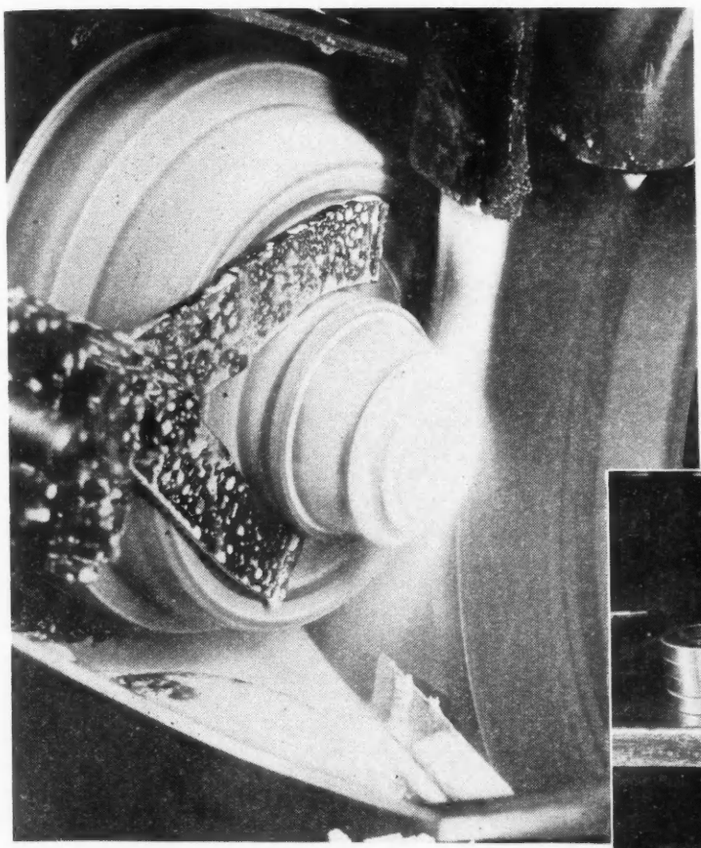
All cup outside diameter grinding is done on Cincinnati centerless grinders, the wheels operating at 1100 r.p.m.

Cup internal diameters are finished on Heald ID grinders, the wheel speed being 8600 r.p.m. and the work head revolving at 750 r.p.m.

(Left) Closing in cage and roll assembly on cones represents last step in the mechanical operations. Assemblies coming from the press are fitted with cups and sent to the packing department

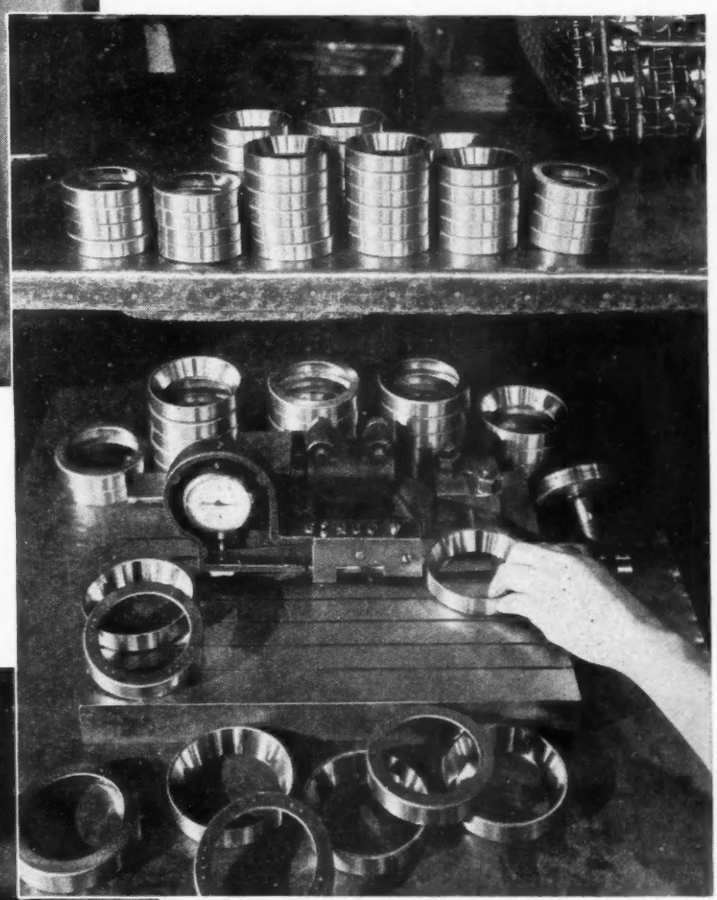


(Right) Roll Gaging. Here each roll sliding down the tube on the right from a hopper above is fed into an electrical gage which automatically sorts the rolls in terms of a fifth of a thousandth of an inch. Each of these roll sorting machines checks 100,000 or more rolls a day, sorting them out into cans which pass along to the assembly department so that only one size of rolls will go into any single bearing



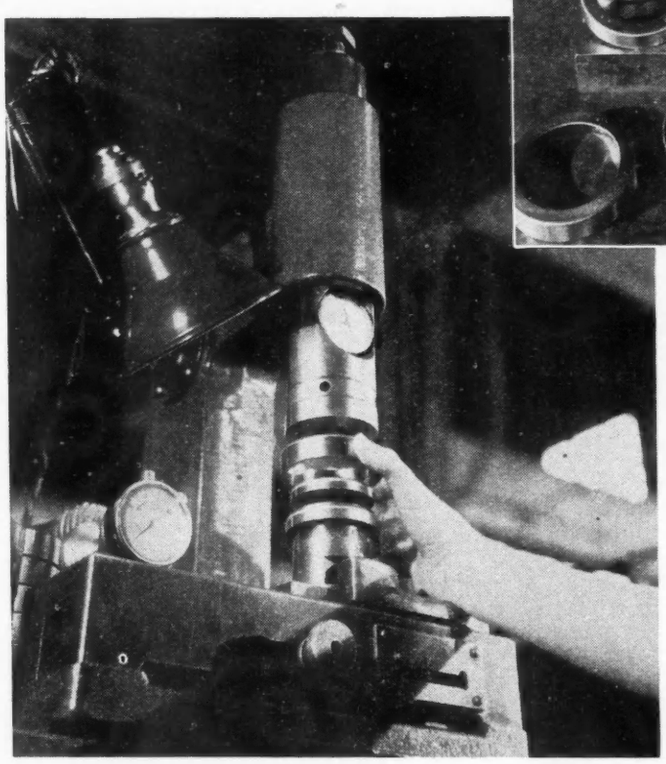
(Left) Cone Grinding. Finish ground to size, the bearing parts move on toward assembly. Here we see an automotive size bearing cone, or inner race, being ground on an automatic grinder. The cone is slipped on an expanding spindle in the machine shown by hand and the specially shaped wheel advances automatically, retreating again when the cone has been ground to size. The fork then flips the cone off the spindle, which is ready for another piece

Landis, Norton and Brown & Sharpe automatic grinders are used. Wheel spindle speeds being around 2000 r.p.m. and work head speeds 350 r.p.m. Tolerance for the outside diameter is plus 0.0002 in., minus nothing. Bores are finished on Heald grinders, with a tolerance of 0.0005 in. plus-minus nothing



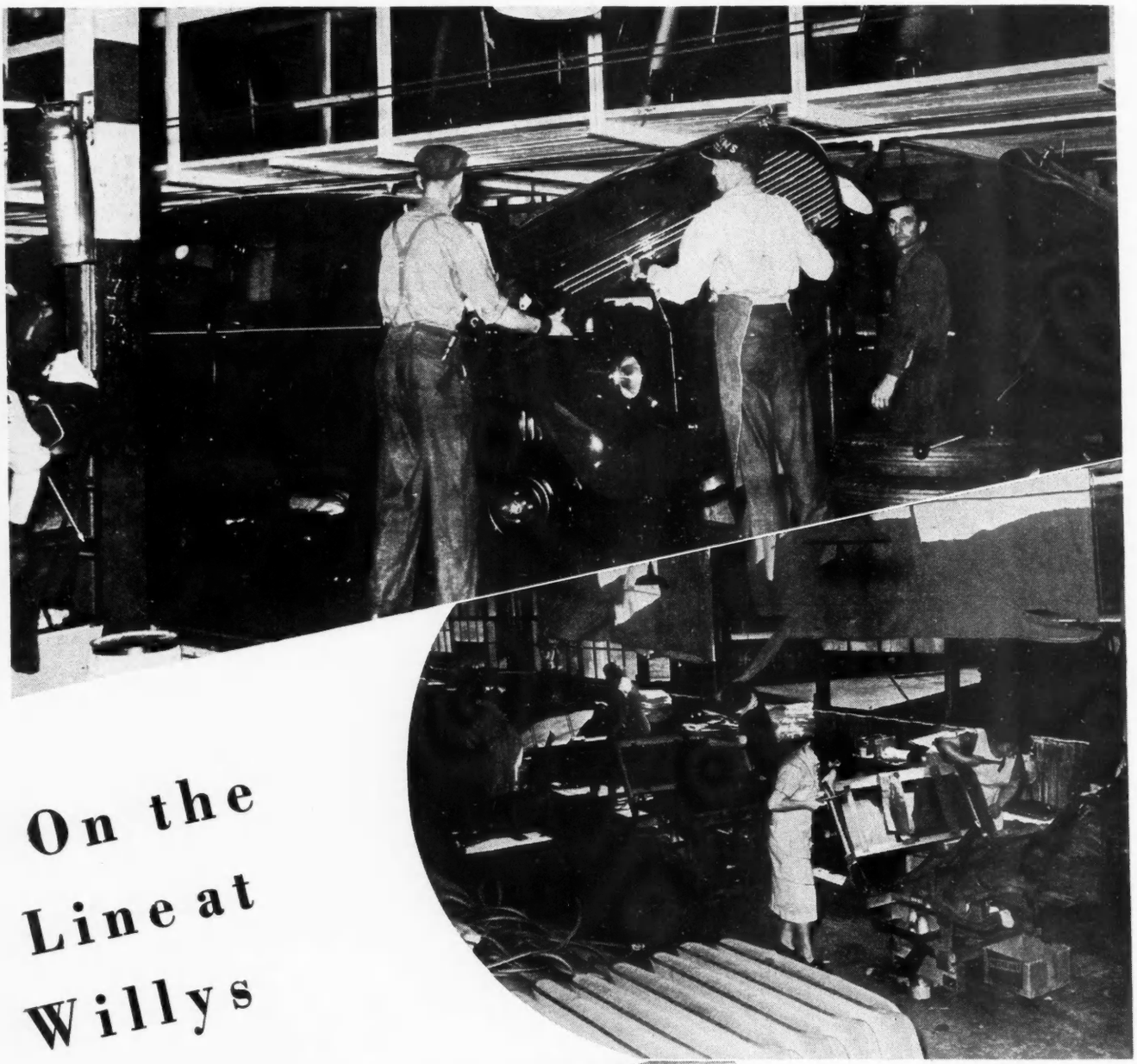
(Below) Inspection. Even though the parts are inspected as they leave the finish grinders, every piece must again be checked for "stand" and "taper." Here we see an automotive size bearing cup ready for test

Ordinarily 0.0002 in. tolerance is allowed for taper, with a maximum of 0.004 in. high for stand on the plug, minus nothing

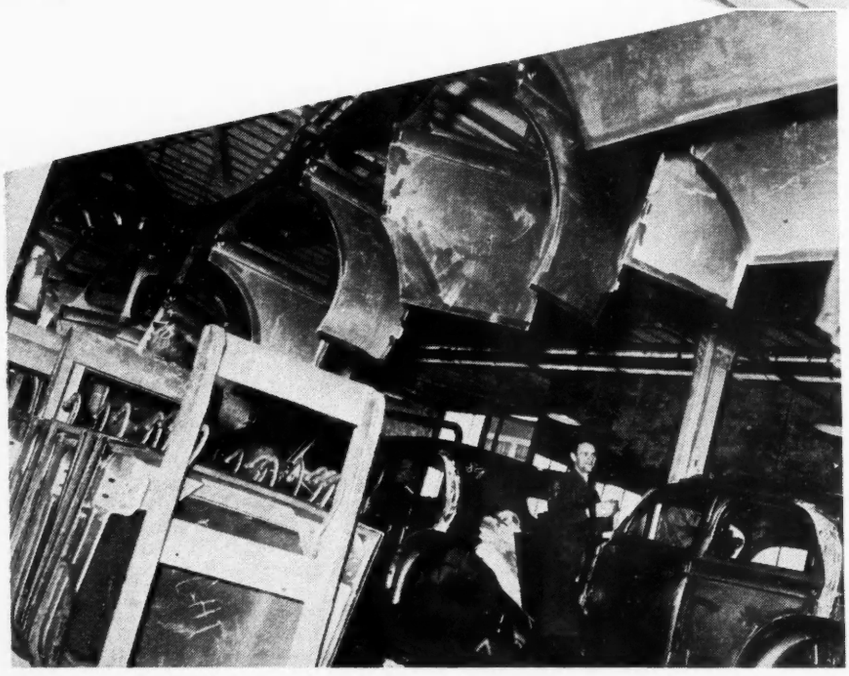


(Above) Inspection. Still another step in the inspection program, checking outside diameter this time—with a master gage right beside the machine to check and double check at intervals

A tolerance of only plus 0.001 in., minus nothing, is all that is allowed for the average automotive bearing, precision bearings being limited to half a thousandth



On the Line at Willys



(Top) View on final assembly line at Willys. Operators attaching alligator hood to complete sheet metal assembly

(Above) These women "man" the trim department at Willys in Toledo. Here is a shot of the assembly and trim line for front seat assembly

(Left) Corner of body assembly and metal finishing line at Willys, showing door feeder line traveling on the overhead monorail

Just Among Ourselves

What Do Prices Mean to Sales

SALES executives in the automobile industry are very reluctant to commit themselves on the probable reasons for the present recession in sales. We record with particular interest, therefore, the views of a vice-president and sales director who was good enough to put his views on paper, in response to a recent inquiry about automobile prices and their effect on sales. His words are set down without any comment, and anonymously, but they are exactly as written. He says:

"I do not consider that the present price level of automobiles will have any material bearing on the industry over the twelve months' period. Without question, the prices as announced at the shows were rather a shock to the automobile purchasing public, as over a number of years prices have not been materially increased. I think that the objection to price will level itself off within a very short time.

"I think by far the factor which is going to have more effect upon volume sales than any other is the present unrest which seems to exist throughout the country concerning the future economic condition. It seems to be the feeling among people with whom I have talked in the last few weeks during a trip which I made to the Pacific Coast recently that Congress will have to take some very quick action with reference to adjusting certain taxes on business which are of a restrictive nature, and that the Administration will have to make a very definite move toward endeavoring to balance the national budget, plus getting out of the labor-organizing business, before any definite turn for the better can be expected.

"Frankly, we do not anticipate the possibility or necessity of revising the price structure downward at this time. Present prices of automobiles were necessitated through the advance of both labor and material, and until there is some revision in these costs a general decrease in price is absolutely prohibitive."

U.A.W. Scrambles Significances

ANOTHER document-of-the-week which interested us very much was the following verbatim release from the publicity bureau of the United Automobile Workers in Detroit.

"*The Saturday Review of Literature*, controlled by Thomas Lammont [sic] a partner of J. P. Morgan, in its issue of Nov. 13, carries a full-page review which comments most favorably on Upton Sinclair's fictionized biography of Henry Ford, 'The Flivver King.'

"Significance is attached by the UAW to the fact that the Morgan interests, powerful in the councils of General Motors Corporation, Henry Ford's chief competitor, has in one of its journals permitted a reviewer to declare: 'After reading this booklet, one is convinced that Homer Martin of the United Automobile Union showed good judgment when he ordered 200,000 copies of it for distribution among the Ford workers. It will unquestionably lead many to join the UAW.'

"The reviewer, Prof. Paul H. Douglas, declares that 'all must admit that as a social pamphleteer he (Sinclair) has been virtually unrivaled in modern America.'

" 'There is no hate in it,' says Douglas of Sinclair's tale of the Ford tragedy. What emerges from the book, in the eyes of economist Douglas is that 'The tragedy lies in the fact that he (Ford) does not see that an automatized mass production movement almost inevitably creates a counter mass movement of the workers to help control their destiny, and that instead of meeting it half-way with the free and generous spirit which once moved within him, he refuses to countenance it and does not check his subordinates when they use unworthy and undemocratic methods to combat it.' "

Just a Word of Comment

WE can't let that one go without comment. We, too, attach significance to the fact that the review appeared where it did, but we don't think it is the same significance attached by the union. The union is using the fact for propaganda and it is one of the jobs of the propagandist to swell pinheads into forging rams. The real significance of the review to us, is that the press in this country is still enlightened enough to print the comments of an enlightened reviewer, such as we know Doctor Douglas to be. Corollary: and the "capitalist" owners of our reviews are generally broad-minded enough not to descend to tacit suppression of a book like "The Flivver King." Thirdly, as an admirer of Bernard DeVoto, editor of *The Saturday Review of Literature*, we rather think he wouldn't be editor of the publication unless the above facts were true.—H. H.

Effect of Air Entry Angle on Two Stroke Engines

IN two-stroke engines with admission to the cylinder through ports in the cylinder wall at the bottom of the stroke, the ports are often inclined to the radial with the object of producing turbulent flow in the cylinder, and to the axis of the cylinder with the object of improving the scavenging effect. There is comparatively little data available as to the optimum angles of inclination, and the N.A.C.A. is to be commended for having investigated this subject at the Langley Memorial Laboratory. A report on the details of the experimental work and the results obtained is contained in Technical Note No. 610, "Effect of Air-Entry Angle on Performance of a Two-Stroke Cycle Compression-Ignition Engine," by Sherod L. Earle and Francis J. Dutee.

Tests were made on a single-cylinder water-cooled engine of 4⅝-in. bore and 7-in. stroke. Air is admitted through eight inlet ports at the bottom of the cylinder liner and exhaust takes place through four poppet valves recessed 1/16 in. in the cylinder head. The combustion chamber is of flat-cylindrical form between the piston and cylinder head. A diagrammatic drawing of the test equipment is shown in Fig. 1. Scavenging and combustion air are supplied by an independently-driven 4-in. Roots blower with a large surge tank interposed between it and the engine manifold. Removable guide vanes direct the air into the cylinder at the desired angle. A negative pressure of about ¾ in. of water was maintained in the exhaust trench by a large-capacity fan. The pressure of the scavenging air was indicated by a mercury manometer connected to the surge tank.

Tests had shown that the lengths of the inlet and exhaust pipes strongly influenced the charging efficiency, and therefore the power output, of the engine. The pipe lengths can be adjusted to give optimum performance at any given engine speed, at the expense of decreased output at other speeds. In order to eliminate the factor of pipe length from the tests, the surge tank was closely coupled to the engine manifold by a large-diameter pipe, and the exhaust stacks were just long enough (6 in.) to accommodate a cooling-water connection and a flanged fitting.

A compression ratio of 13.5 based on the swept volume (11.8 based on the volume above the ports) was used. The four exhaust valves had a port diameter

(Turn to page 815, please)

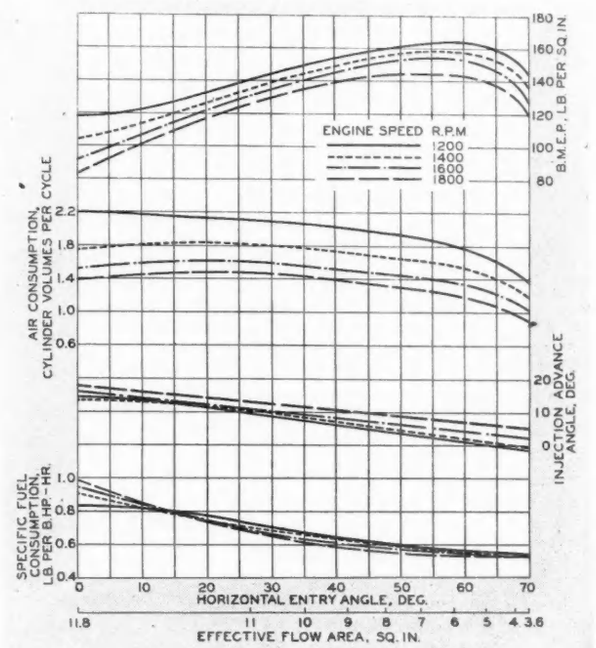


Fig. 2 — (Right) Effect of horizontal air-entry angle on engine performance. Variable floor area. Scavenging-air pressure 15 in. of Hg.

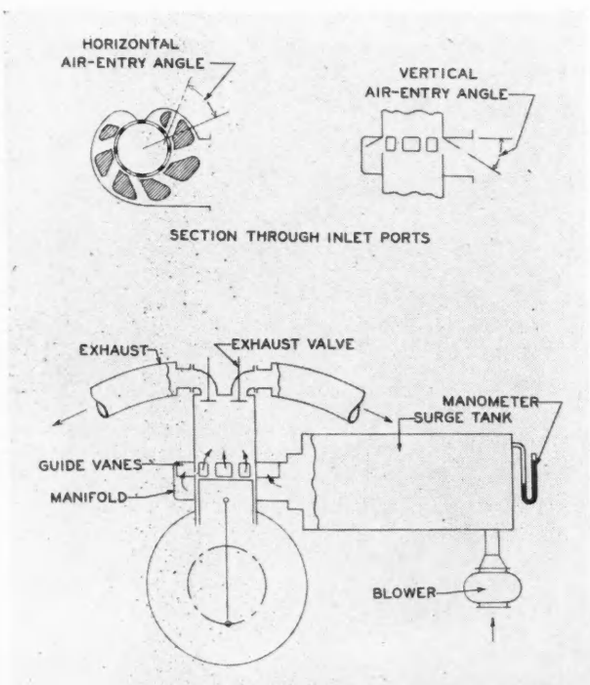


Fig. 1 — (Left) Diagrammatic arrangement of test equipment.

No. 7 of the Second Series of AUTOMOTIVE INDUSTRIES
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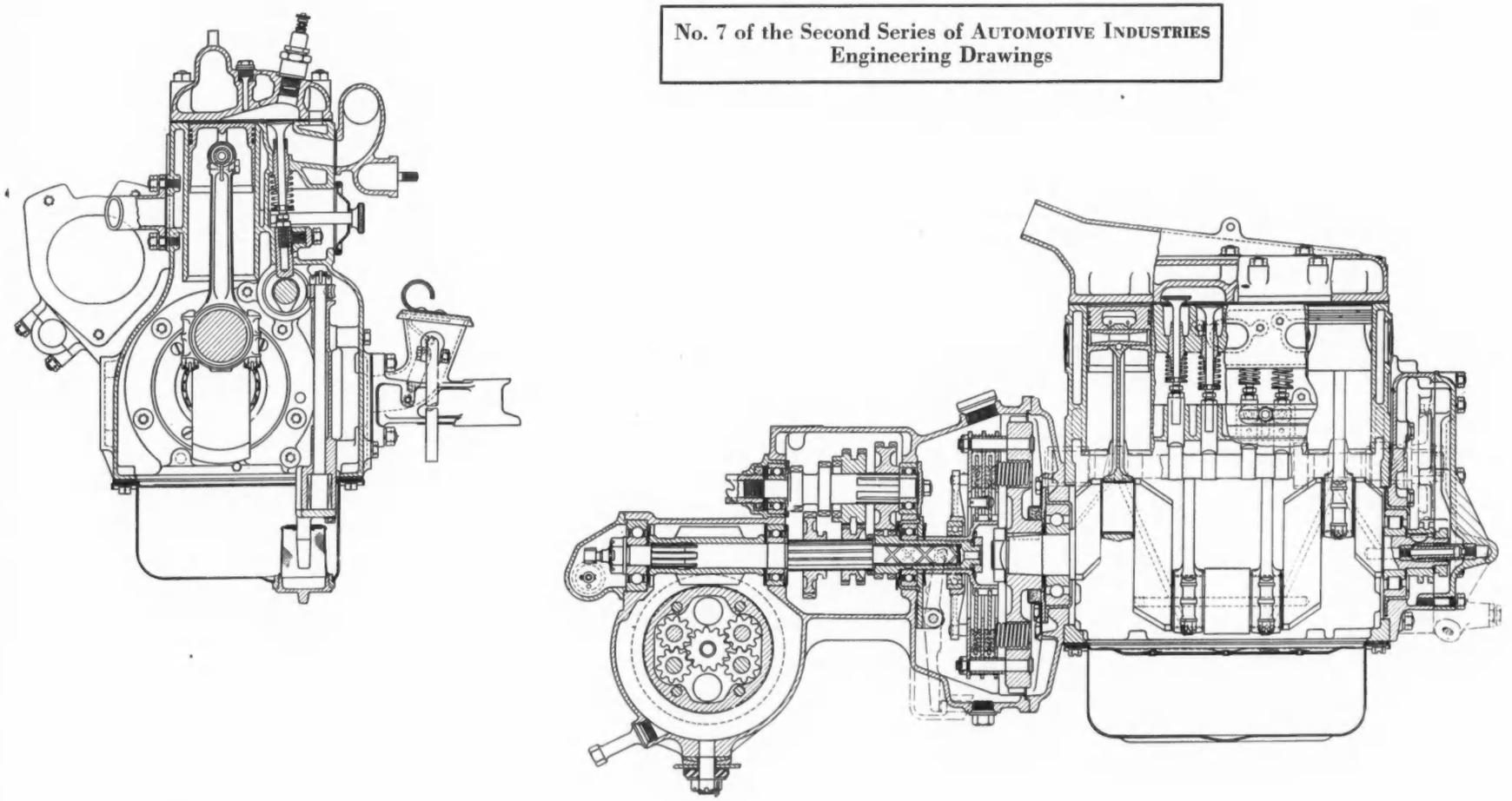
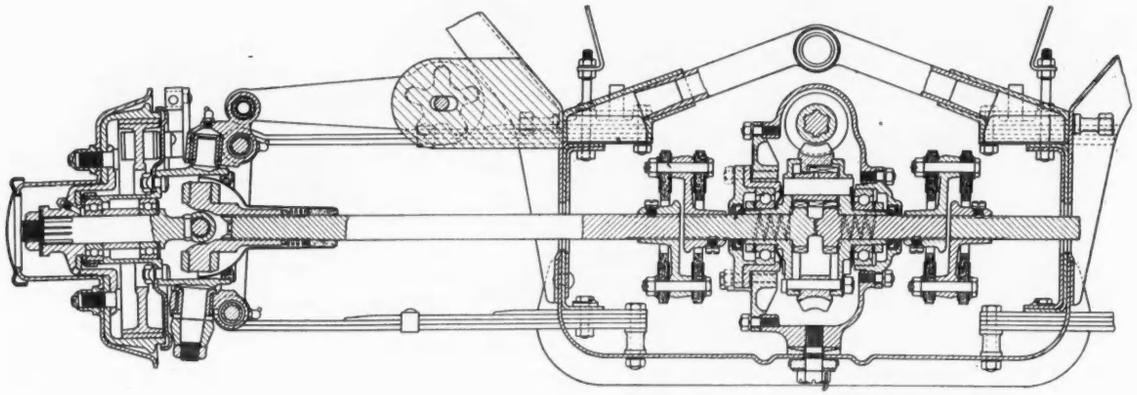


B.S.A. Front-Wheel Drive Power-Unit

B.S.A. Front-Wheel-Drive Power-Unit



Developed from a three-wheeled runabout into a four-wheeled light car, the B.S.A. Ten-Four is the only British make with front-wheel drive.

The four-cylinder L-head engine has a displacement of 73.5 cu. in. It has a cast-iron head, a two-bearing crankshaft (roller bearing at rear, ball bearing in front), with 2-in. diameter crankpins and camshaft drive by chain at the rear end. Lubrication is by pressure to the "big ends" and the camshaft rear bearing, by splash to the main bearings. Oil is introduced to the drilled crankshaft through a special spring-loaded union at the rear end. The clutch is a dual-plate with cork inserts running in oil, the plates being of aluminum alloy.

The three-speed transmission is of the ordinary type without synchromesh. There is a starting-crank claw on the front end of the layshaft, the engine being cranked over through the constant-mesh gears, which latter, the same as the second-speed gears, have double-helical teeth.

Final drive is by overhead worm with a ratio of 5.2:1; the speedometer drive is taken off at the front end of the worm shaft. Transverse propeller shafts have fabric disk joints at their inner ends and star universals within the swivel axle assembly. Brakes are 8 in. in diameter, with shoes 1½ in. wide; both the pedal and the hand lever operate the front and rear brakes.

Swivel axle heads are located by eight quarter-elliptic springs which also transmit torque and drive.

Effect of An Entry Angle on Two Stroke Engines

(Continued from page 812)

of 1 19/32 in. and the total exhaust-port area at the minimum section was 7.3 sq. in. Valve and port timing was as follows (measured from top dead center): Exhaust opens, 95 deg.; exhaust closes, 228 deg.; inlet opens, 130 deg.; inlet closes, 230 deg.; exhaust-cam dwell, 12 deg. Each of the eight inlet ports was 1.45 in. wide and 1 in. high. Oil leaving the engine was at 155 deg. Fahr., water at 110 deg. Fahr., while the temperature of the air entering the blower (average room temperature) was 80 deg. Fahr. The maximum cylinder pressure recorded was 1000 lb. per sq. in.

Fuel was injected by a Bosch cam-operated, constant-stroke pump with 9-mm. plunger and an injection period of 40-45 deg. through an N.A.C.A. automatic nozzle spring-loaded to 3000 lb. per sq. in., with three orifices in the same plane 60 deg. apart, the central orifice of 0.020 and the side orifices of 0.010 in. diameter. The fuel used was Diesel oil of 0.83 specific gravity at 68 deg. Fahr., 41 seconds Saybolt universal viscosity at 80 deg. Fahr. and 68 cetane number. Maximum-pressure diagrams were taken with the Farnboro and the balanced-pressure indicators.

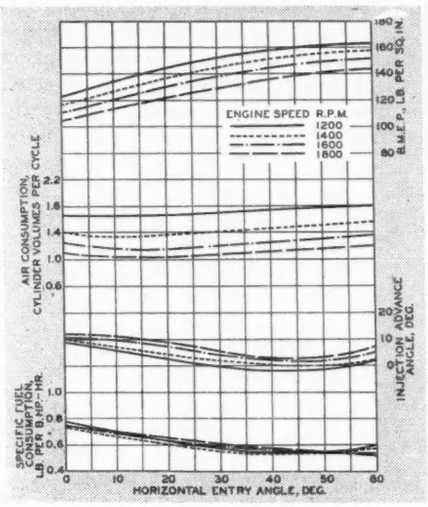


Fig. 3—Effect of horizontal air-entry angle on engine performance. Constant flow area 5.7 sq. in. Scavenging-air pressure 15 in. of Hg.

From the experimental data obtained in the investigation the following conclusions were drawn:

1. The air-entry angle for best performance varied between 45 deg. and 60 deg. from radial, decreasing with increasing engine speeds and lower scavenging-air pressures; 60 deg. was chosen as optimum.

2. Engine performance was adversely affected by deflecting upwardly the entering scavenging and combustion air.

3. Maximum engine output was obtained when the horizontal air-entry angle was 60 deg., and under this condition the engine developed 0.65 gross b.hp. per cu. in. of piston displacement. The specific fuel consumption decreased with increase in air-entry angle and was a minumum at the optimum angle.

4. The air consumed per cycle decreased with flow area and was approximately inversely proportional to the engine speed. Also, the air consumption increased linearly with scavenging pressure.

5. From considerations of specific

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fuel consumption the optimum scavenging pressure was found to increase linearly with engine speed.

6. For any given air-entry angle the b.m.e.p. increased uniformly with air consumption in cylinder volumes per cycle regardless of engine speed and scavenging pressure.

7. The friction mean effective pressure increased with air-entry angle, scavenging pressure, and engine speed. In general, the variation was small over the entire range of variables investigated, the value ranging between 19 and 26 lb. per sq. in.

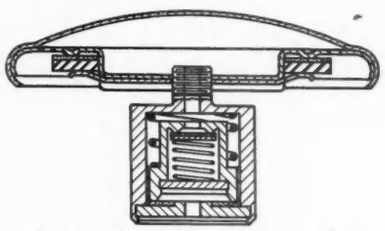
Special Training in Technical Writing

ANSWERING the need of technical men for a proper mastery of the English language if they are to write for publication clearly and effectively, the Extension Division of the University of Wisconsin, at Madison, is offering a home-study course in Composition of Technical Papers, available to individuals anywhere. This subject, one of a large number in the correspondence-study field, is offered as a helpful means of acquiring excellence in writing under guidance, without interruption of the daily occupation.

The course is described as adapted especially to the requirements of active technicians desiring to increase their proficiency in writing business letters, reports, and articles for publication. It presents in a few assignments the essential principles of English composition, the planning and arrangement of technical papers, and other phases of efficient writing in a specialized field.

Double Check Valve Stops Fuel Evaporation

A DOUBLE check valve for gasoline tanks, known as the Quinplex, is being sold by the American Dioxidyne Corp., Pittsburgh, Pa. When applied to the filler neck in place of the usual vented cap, it completely closes the interior of the tank to the atmosphere under normal operating conditions, thereby preventing loss of gasoline vapor through the vent hole, and the resulting fuel economy is one of the principal claims made for the device. If the pressure within the tank drops below atmospheric, the light-spring valve opens and admits air to the tank, so that the latter is still properly vented and the fuel feed is not interfered with. With the car in operation, owing to the backward rush of heated air from the engine compartment, the fuel tank is raised to a temperature slightly above atmospheric, hence there will be some over-pressure in it, which tends to prevent vapor lock in the line to the carburetor. Should the tank pressure exceed 3 lb. per sq. in., the second (heavy-spring) check valve will open and relieve it.



Sectional view of Quinplex double check valve which attaches to filler cap of fuel tank

One advantage claimed for the Quinplex is that if the fuel pump should become inoperative, the pressure in the tank would maintain the feed until the filler cap was removed at the filling station. As the volatile fractions of the fuel are prevented from escaping through the vent hole, the fuel does not "grow stale" but retains its "easy-starting" properties.

The Quinplex cannot be used on cars having either a vacuum fuel-feed system or a liquid fuel gage.

ONLY LAPPING *As Strom Does It* CAN PRODUCE SUCH PRECISION

Strom Steel Balls possess a degree of surface smoothness and sphericity that has never been equalled in any other regular grade of ball. Such precision is exclusive with Strom because it can be attained only through a series of lapping operations such as are standard practice in the Strom plant.

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Other types of balls—*stainless steel, monel, brass* and *bronze*—are also available in all standard sizes. Write for complete details.

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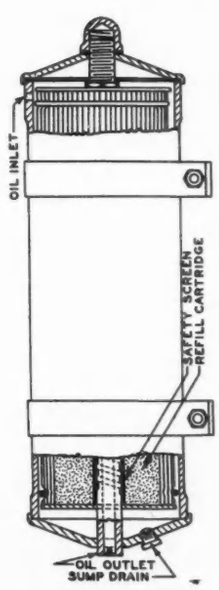
Anti-Oxidizing Agents for Cracked Fuels

IN spite of their high anti-knock values, cracked gasolines are very little used for aircraft engines. This is due to their tendency to form gum, which is deposited in the fuel pipes and the carburetor. It has been shown by Messrs. Vellinger and Radulesco (who presented a paper on the subject to the World Petroleum Congress in Paris last Summer) that the formation of gum is due to oxidation of non-saturated hydrocarbons, which form an important constituent part of cracked gasolines. It occurred to them that this gum formation might be prevented by the addition of anti-oxidizing agents. The experimental work reported upon by the authors in their paper showed that there are substances of this nature which give a sufficiently long "period of induction," at high temperature, to prevent the formation of gums in the lines of internal combustion engines. These gums will develop also in gasoline during storage periods. It is the opinion of the authors that in that case also gum formation may be prevented and the storing period of cracked gasolines extended, by the addition of anti-oxidizing agents. They propose in their paper a checking system which records the beginning of change in the gasoline marked by the absorption of oxygen in the dark.

Briggs Oil Clarifier

An oil purifier or clarifier which operates on the principle of slow filtration, under low pressure, through a porous block of Fuller's earth, is being manufactured by Briggs Clarifier Co., Washington, D. C. It is made in a range of sizes, the smallest size, Model D-100, being suitable for automotive applications. A part sectional view of the clarifier is shown herewith. It is claimed that this clarifier removes not only inert foreign matter, such as carbon, grit and dirt, but also the break-down products of lubricating oil under the influence of heat and pressure, viz., gums, acids and resins.

The Briggs Clarifier can be used also for filtering Diesel fuels to reduce the wear on injection pumps and prevents plugging of injector orifices. When used for filtering the lubricating oil of either gasoline or Diesel engines, it is used as a by-pass filter, and the pressure on it must be so regulated that not more than one gallon of oil will flow through it per minute. The pressure required to produce such a flow depends on the viscosity of the oil and ranges from 4 to 6 lb. per sq. in. for the lighter grades, S.A.E. 10 and 20, to 11 to 14 lb. per sq. in. for S.A.E. 60. The Briggs Clarifier Company has developed a pressure control valve for use in automotive installations, which is set to give the required pressure on the filter.



Briggs Model D-100 Clarifier

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Production Lines

Facts vs. Claims

Much has been said in recent years concerning the incidence and extent of occupational diseases. True, there is a job to be done in almost any manufacturing establishment to assure the health of the workers. But evidently there is no basis for the hysteria that has resulted in the stringent and hastily-conceived legislative program in many industrial states. At least we gather that impression from a reading of an address by Dr. Carey P. McCord, director, bureau of industrial hygiene, Detroit Dept. of Health. "The bugaboo of occupational disease work as viewed by the physician," Dr. McCord said, "is a creation of minds distorted by untruths and truths." He said further, "Controversial situations connected with proposed legislative enactments have led to almost astronomical figures as to the number of occupational disease cases."

Evidently, it would be desirable to have a competent group of technicians study the situation before drastic legislation is drafted in any state.

Just along this line, we were interested in a note which appeared in a recent issue of the Industrial Bulletin (No. 128). Research studies under way in various institutions intimate the possibility that certain dusts added to silica-filled air may aid in staying the ravages of silicosis. Such dust as aluminum, powdered coal, iron oxide, and alkaline earth carbonates appear to have this protective action.

IF all cutting lubricants were sterilized with Derma-San, Oil Dermatitis would be rare. This powerful disinfectant kills pus-forming germs—keeps workers' efficiency at par. Add 1 pint to 35 gallons of lubricant and protect your men from infection.

The HUNTINGTON LABORATORIES Inc.

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DERMA-SAN disinfectant

New Ring

Perfect Circle has scored a perfect score with its new Type 200 piston ring. We first heard about it from Packard early this year before we were permitted to say anything publicly. Then the 200 ring came as standard equipment on Packard for '38 and on the new Buick Dynaflash engine line. Now we learn that the 200 ring is standard equipment on the new and very striking White pancake 12-cylinder engine. Here the special ring alloy and its unique treatment are utilized to provide the needed non-scuffing characteristics as well as perfect compatibility with the extremely hard, replaceable cylinder liners.

Most Automatic

A very tricky fully automatic transmission was demonstrated to us the other day. We didn't have time to go into its innards to any extent, but we did drive it. It's arranged for progressive gear changes without using the clutch at any stage of the proceedings. For gadgetry it beats everything we have seen yet. The inventor purposely left a short wobble stick in its accustomed place so that every gear change is reflected uncannily in precise movements of the gear shift lever, following the movement of the accelerator pedal. That little touch is a great psychological angle in demonstrating a device of this kind. As we understand it, the hook-up on the car we drove consists of a combination of a sucker clutch and an automatic centrifugal clutch. Gear shifts occur through

the influence of manifold depression, the shifts and cross-over movements being handled by a single, single-acting vacuum cylinder. The inventor claims to have demonstrated the device to a number of engineers and will be glad to show it to anyone interested.

Production Progress

The new Zephyrs present the most attractive finish we have ever seen. It's the result of swinging over to baked synthetic enamel in which the customary orange peel effect is removed completely by polishing with a newly developed 500-grit paper. Front fenders, rear fenders, and the new hood —all represent the most advanced development of deep-drawing technique. Elongation is of such high order that specially selected deep drawing sheet steel must be used.

Torque Converter

We have it on excellent authority but quite off the record that a torque converter will be introduced as standard equipment on a heavy-duty line, sometime early next year. Our only reason for mentioning this fact at the moment is its possible future significance in automobile construction. Maybe this type of unit will never be fitted to a motor car—nevertheless, many things that saw the breath of life on trucks and buses eventually became important elements of passenger car design.

Cord Belting

Possessing great transverse and longitudinal flexibility, a new heavy-duty conveyor belting has been developed by Goodrich for use in places where ordinary belting is too stiff or does not trough easily. Instead of using the conventional design of carcass with plies of woven fabric, Goodrich has introduced plies of weftless cords such as are used in the modern heavy-duty truck tire. The entire cord carcass is impregnated with rubber which is said to completely surround each individual cord. It's available in any length, width, and number of plies.

Roughing Vital

We talked recently with a prominent gear man—and the talk led naturally to the production of "quiet" transmission gears. We were particularly impressed with his emphasis on the point that the entire groundwork of quiet gearing is based upon the quality of the roughing operation. It is true that we have amazingly effective processes for finishing gears, but their effectiveness depends to a great degree upon the quality of the roughing job. When the work is presented to a finishing machine, regardless of its nature, it must be as accurate as is commercially feasible and must leave very little of the metal removal for the final cuts. We pass this on to the gear men as being worthy of consideration.

Diesel Buses

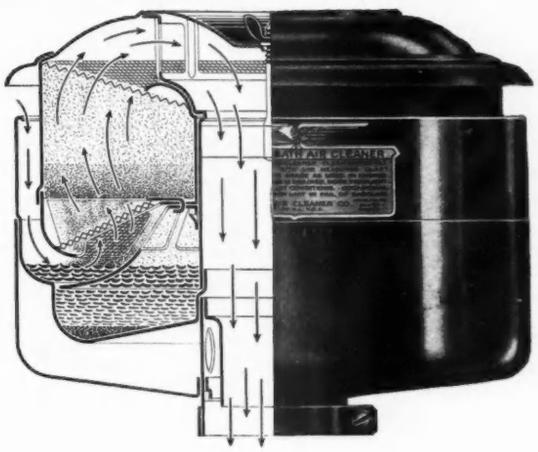
As we understand it, the fleet of 27 Diesel-powered buses in New Jersey has made a remarkable record for performance and operating economies. It would not surprise us at all to find this record reflected in the equipment of buses during the middle part of '38.

Midas Touch

From alarm clocks to railroad trains to washing machines — that's part of the range of versatility of Henry Dreyfuss as an exponent of industrial design. Latest outlet for his talents in the automotive field is the design of the new line of Federal trucks. If it clicks as well as Big Ben did, we look for a lot of interest in Federal.—J. G.

HIGHEST AIR CLEANING EFFICIENCY

Cut-away view of new United oil bath air cleaner and silencer



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COMBINATION QUART SIZE OIL BATH AIR CLEANER AND SILENCER FOR LARGER GAS AND DIESEL TRUCK ENGINES.

A 280 to 300 cubic foot air flow capacity cleaner with a quart size oil reservoir requiring much less servicing. Result, better engine protection. This cleaner is built onto a simple one compartment silencing chamber which is provided with three sound openings. The simplicity of this combination oil bath cleaner and silencer makes it ideal for a wide range of gas and Diesel truck engines where it is not necessary to deaden all manifold noises and power roars.

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Division of United Specialties Company
9705 COTTAGE GROVE AVE. CHICAGO, ILL.

TOOLS OF TOMORROW

(Continued from page 799)

a tripping bar so that it contacts the tripping "button" located in the body of the tap near the shank end.

This tap may be used for any taper of thread ranging from 0, or straight threads, to ¾-in. taper per foot, and may be changed by infinitestimal degrees. To change taper or to adjust for a slight error it only requires release of a locking screw in the control collar and moving the taper indicator.

Cutting coolant is admitted to the tap through a bronze yoke ring located at the rear of the control collar into the hollow tripping ring through the tripping ring supports, which also are hollow. The face plate of the tripping ring is perforated with a series of small holes so located that the entire volume of coolant is directed within the coupling.

Range of the 3AIM tap is from 2 to 4 in. inclusive.

PRIVATE

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Straighteners

. . . for removing sharp bends and kinks from core wire at high speeds.

Machines designed for removing sharp bends and kinks from core wire at a high production speed and forming the stock in reasonably straight condition have been placed on the market by Kane & Roach, Inc., Syracuse, N. Y.

The company reports that its new No. F 5 roll core wire straightener is intended for use with ⅜-in. to ¾-in. core wire, though it has handled core wire down to ⅛-in. A smaller Kane & Roach core wire straightener, known as No. DX, has a capacity of 3/16-in. to ⅜-in., and

The Kane & Roach core wire Straightener

this unit has been used for straightening wire down to No. 12 gage.

The frame of this machine is of box-form construction, and the top plate extends the full width of the frame. Roll shaft and reduction gearing are enclosed in a cast iron oil-tight gear box, and the frame is mounted on a cabinet type base with a platform extending under the roll shafts for the full length of the machine.

Pinch roll shafts are furnished with rugged outboard bearings and are spring loaded to allow for slight variation in the gage of wire. The main drive shaft is mounted in anti-friction bearings; all other shafts are carried in bronze sleeve type bearings.

Intermediate and roll shaft gears are cut steel, hardened. The roll shafts are chrome nickel steel, heat treated, accurately machined and ground.

The machine is arranged for direct

connection to an electric motor through the medium of chain drive. Production is estimated by the manufacturer at 100 ft. to 125 ft. per min.

Gage Inspection

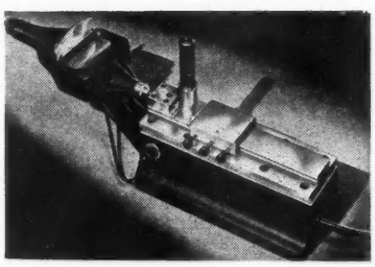
. . . Sheffield type checking device for tapered plug gages.

For accurate inspection of tapered plug gages, the Sheffield Gage Corp., Dayton, Ohio, offers a new visual type checking device.

The instrument used to check the small diameter of the taper has a plain horizontal bed. On one end of this bed is an adjustable anvil, on the other a visual gage head. This head incorporates the Sheffield Reed Mechanism which eliminates the use of gears, levers, knife edges, or any element operating under sliding contact.

In checking the small diameter of a tapered gage on the device, precision gage blocks equivalent to the true diameter of the small end of the taper are stacked on the horizontal bed between the adjustable anvil and the gaging element. A standard gage roll is then placed tangent to each end of this stack and the adjustable anvil moved up so as to bring the blocks and rolls into contact with the gaging element. Sufficient pressure is developed by the fine adjustment of the gage to place the shadow on the visual dial face at zero.

The actual small diameter of the gage is read directly by substituting it for the stack of blocks. The shadow on the dial face indicates exactly how much this diameter is under size or over size.



Checking the small diameter of a taper plug gage with the new Sheffield inspection instrument

Value of the taper angle of the plugs is determined by using a standard visual gage in conjunction with a master angle block. This is a wedge-shaped block used as a fixture to hold the tapered plug on the anvil of the visual gage. The angle between the base and the hypotenuse of the wedge is equal to the entire included angle of the taper. Thus, with the tapered plug lying along this hypotenuse, its upper side will be horizontal if its dimensions are correct.

With the visual gage set at zero at a point on the small diameter of the taper which has already been checked, the plug and block are slid longitudinally under the spindle of the visual gage until the large end is reached. Any variation in true taper is read directly on the visual gage dial. If the shadow remains on zero from one end of the plug gage to the other, the taper is correct.

Threading Machine

. . . new Geometric equipment for precision threading of duplicate parts.

A new machine intended for the precision threading of duplicate parts has just been placed on the market by the Geometric Tool Co., New Haven, Conn. The equipment will cut standard pitches up to 9/16 in., fine pitches in larger sizes. Either a Geometric style KD die head with conventional milled or

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Aetna "T" Type
Clutch Release Bearings

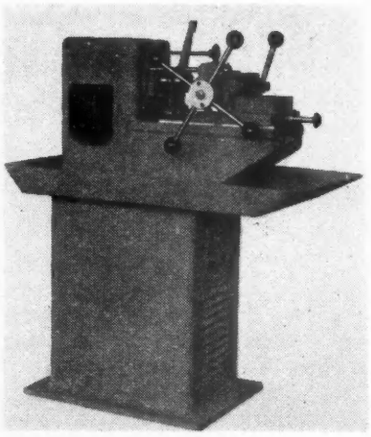
tapped chasers, or the style TR Geometric die head with tangent or circular chasers may be employed.

It is possible to use a large number of different holding devices with this machine. The manufacturer supplies either a standard two-jawed vise or a standard collet chuck.

Both the standard vise and the standard collet chuck are equipped with an adjustable alignment feature. Vertical and horizontal adjustment of the work holder may be readily made without the use of gibs or shims.

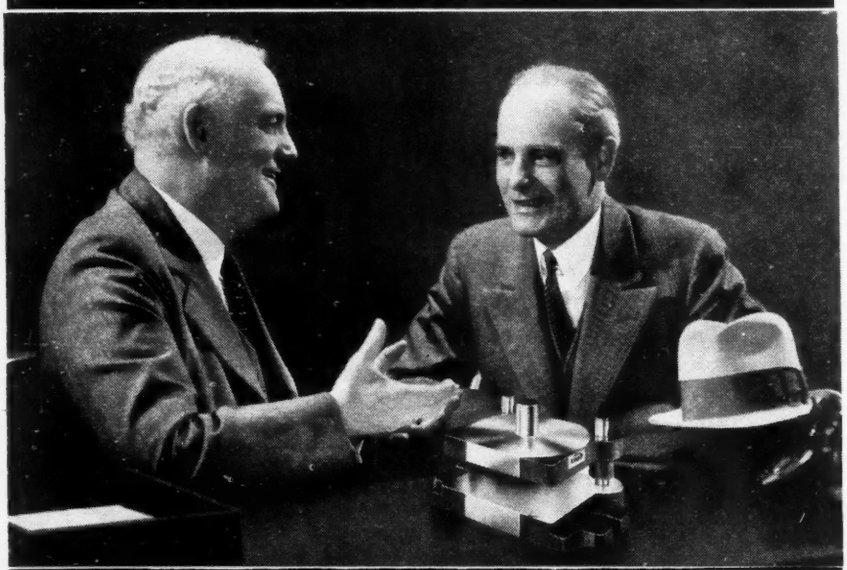
The machine shown in the photograph reproduced herewith is equipped with the standard two-jaw vise. In back of the turnstile is shown the automatic work gage which gages the proper setting of the work, then swings out of the way as the work is tightened in the vise.

Work spindle and drive shaft, made of special alloy steel hardened and ground, are mounted on Timken roller bearings. Pick-off change gears permit a wide range of threading speeds, desirable when threading different diameters and various materials. Drive is by double V-belt from a motor mounted in the base. An automatic reversible type pump supplies coolant.



Machine for precision threading of duplicate parts. The equipment is made by the Geometric Tool Co.

PRECISION PAYS



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One Hundredth Anniversary of the Metric System

IN France the one-hundredth anniversary of the final adoption of the metric system is being commemorated this year. It was in 1837 that the decree was issued that definitely ended the multifarious systems of weights and measures that had been in use for ages in different parts of the country.

When this decree was published the metric system had been in use for some time, but the population was slow in accepting it, and after the fall of Napoleon, who was to a great extent responsible for its adoption and its spread through Europe, there was a wide return to old customs.

Talleyrand is credited with having put forward the original idea, when he proposed to the National Assembly that a universal system of weights and measures should be devised and suggested by France for acceptance by other nations. Scientists gradually evolved the standards that produced the decimal system, the meter, the gram and the liter, but it was not until 1799 that the meter was officially enthroned.

The French scientists set forth the the metric system as one "suitable for all peoples and all ages." Their dream has now become a reality, and in the Palace of Discoveries in the Paris Exposition of 1937 there is a map showing that the metric system is in use and legal in every country of the world. In the British Empire and the United States the metric system is employed for scientific measurements. — *Industrial Standardization.*